

PART II

**CLASSIFICATION OF
SAND AND GRAVEL RESOURCE AREAS
SAN FERNANDO VALLEY
PRODUCTION-CONSUMPTION REGION**

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INTRODUCTION

Land in the San Fernando Valley Production-Consumption region of the greater Los Angeles metropolitan area has been classified by the California Division of Mines and Geology (DMG) according to the presence or absence of significant sand and gravel deposits (Plate 1.2). The land classification is presented in the form of Mineral Resource Zones (MRZ), defined in Part I of the *Mineral Land Classification of the Greater Los Angeles Area*, on seventeen U.S. Geological Survey topographic quadrangle base maps which accompany this report (Plates 2.5 - 2.21). Refer to Figure 1.3 and Table 2.1 for index of quadrangle maps covering the San Fernando Valley P-C region. A list of lead agencies located within the San Fernando Valley P-C region is presented on Table 2.2.

ESTABLISHMENT OF MINERAL RESOURCE ZONES

Mineral Resource Zones within the San Fernando Valley P-C region are established on the basis of a sand and gravel resource appraisal which includes study of pertinent geologic reports and maps, field investigations, visits to active sand and gravel mining operations, analyses of drill hole data collected from the past 75 years, and inspection of aerial photographs and private company documents.

Areas Classified MRZ-1

Several areas located within the San Fernando Valley P-C region have been classified MRZ-1. These are areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence (*Guidelines for Classification and Designation of Mineral Lands*, Appendix A-3, p. 43).

These areas occur mainly within the interior parts of the San Fernando Valley and Los Angeles basin (Plate 2.1). Drill hole data indicate that these areas are underlain by sedimentary deposits composed predominantly of fine-grained material unsuitable for use as aggregate.

Areas Classified MRZ-2

Two areas within the San Fernando Valley P-C region have been classified MRZ-2. These are areas where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists (*Guidelines for Classification and Designation of Mineral Lands*, Appendix A-3, p. 43). Both areas occur within the San Fernando Valley, an elongate basin about 15 miles long (Plate 2.1).

5. Oat Mtn.	22. Malibu Beach
6. San Fernando	23. Topanga
7. Sunland	24. Beverly Hills
8. Condor Peak	25. Hollywood
9. Calabasas	26. Los Angeles
10. Canoga Park	36. Venice
11. Van Nuys	37. Inglewood
12. Burbank	47. Redondo Beach
13. Pasadena	

TABLE 2.1 List of U.S. Geological Survey 7 1/2 minute quadrangles covering the San Fernando Valley P-C region (accompanies Part II of the Greater Los Angeles Area Mineral Land Classification Study). Quadrangles show existing urbanized areas, urbanizing areas, and Mineral Resource Zones (MRZ). Quadrangles are indexed on Figure 1.3 by the above number list.

LOS ANGELES COUNTY

Beverly Hills	Inglewood
▲ Burbank	La Canada Flintridge
Culver City	* ▲ Los Angeles
El Segundo	Manhattan Beach
▲ Glendale	▲ San Fernando
Hermosa Beach	Santa Monica

TABLE 2.2 List of lead agencies (county and incorporated city governments) located within the San Fernando Valley P-C region. Cities that have active aggregate operations within their jurisdictional boundaries are denoted by asterisks. Cities that have land within their jurisdiction classified MRZ-2 are denoted by ▲

Geologic conditions control the distribution of aggregate resources in the San Fernando Valley P-C region. The land in the San Fernando Valley basin contains sand and gravel deposited in a broad system of coalescing alluvial fans that have filled the valley floor. Alluvial fan deposits are formed when mountain streams carrying large volumes of sand and gravel enter a valley or plain. The abrupt change in slope causes a sudden decrease in the transporting energy of the stream and deposition of sand and gravel occurs. Alluvial fan deposits suitable as a source of aggregate are confined to the eastern portion of the valley.

The deposits were laid down as a result of tectonism and alluviation. Tectonism caused an effective lowering of the base level of the drainage system, resulting in increased erosional energy of the stream system. Deep channels were cut through older valley alluvium and were subsequently filled with sediments originating primarily from the San Gabriel Mountains to the north. The channel fill contains sand and gravel composed of hard, durable particles of igneous and metamorphic rocks typical of the source area.

In order for a deposit of sand and gravel to be categorized as significant, it must satisfy the criteria given in the *Guidelines for Classification and Designation of Mineral Lands* (Appendix A-3) as well as the following:

- (1) The deposit must consist of sound, durable material substantially free of chemically reactive substances that would preclude its use as a construction material.
- (2) The geologic factors that resulted in the formation of the deposit must be understood clearly enough so that reasonable subsurface interpretation can be made from surface exposure of the material and from drill hole data.

The only deposits within the San Fernando Valley P-C region that satisfy these criteria occur within the Tujunga alluvial fan and the Pacoima Wash.

Tujunga alluvial fan

The Tujunga alluvial fan deposit is located in the eastern San Fernando Valley at the mouth of Big Tujunga Canyon. Material found within the deposit is composed of fresh, durable rock debris generally consisting of granitic and metamorphic rock fragments originating from the San Gabriel Mountains north of the San Fernando Valley. Grain size of detrital material found in the alluvial fan ranges from clay-size particles to large boulders several feet in diameter. Characteristically, the coarsest material is found near the head of the alluvial fan adjacent to the San Gabriel Mountains, and the finer material occurs in distal portions of the alluvial fan.

The thickness of aggregate deposits in the Tujunga alluvial fan varies considerable (Plates 2.2 and 2.3). About 2 miles southwest of Hansen Dam, sand and gravel have been identified in drill holes to a depth of about 500 feet (Plate 2.3). Sand and gravel are found to depths of about 100 feet in the upper part of the alluvial fan east of Hansen Dam.

Aggregate is produced from the Tujunga alluvial fan deposits in the Sun Valley area, located in western San Fernando Valley (Figures 1.2 and 2.1). The earliest known operations in this production district took place in the first decade of the twentieth century. Tujunga Rock Company was operating in 1909, and by 1927 ten companies were producing from the district (Tucker, 1927). In 1979, mining operations were conducted from four separate sites in the production district (Figure 2.2).

Pacoima wash

Pacoima Wash emanates from Pacoima Canyon on the south slope of the San Gabriel Mountains (Plate 2.3). Detrital materi-

al within this wash breaches an older alluvium and can be traced southwesterly for a distance of 1.5 miles to Lopez Dam. This deposit is about 0.1 mile wide at the mouth of the canyon and increases in width to 0.3 mile near Lopez Dam. Drill hole records show that sand and gravel extends to a depth of over 100 feet within the channel south of Lopez Dam. However, there is nothing within the records indicating that all of the material throughout this column is suitable, or whether portions of it represent older, weathered alluvium. The areal extent of this deposit between the mouth of the canyon and Lopez Dam covers over 200 acres.

The deposit is composed of fresh, durable detrital material. Grain size ranges from clay-size particles to boulders several feet in diameter. It is estimated that approximately 65 percent of this deposit consists of coarse material. The remaining 35 percent is mostly sand with minor amounts of silt and clay. Although physical tests are available to indicate whether the material represents a suitable source for concrete aggregate, its appearance suggests that it would be acceptable.

Four hundred thousand tons of material were mined from Pacoima Wash for use in construction of Pacoima Dam during the period from 1925 to 1929 (Gay and Hoffman, 1954). The extraction site was located about one-half mile southwest of Pacoima Dam.

Areas Classified MRZ-3

A substantial portion of the San Fernando Valley P-C region has been classified MRZ-3 (Plate 2.1). Areas classified MRZ-3 are those areas containing mineral deposits the significance of which cannot be evaluated from available data (Appendix A-p. 43). MRZ-3 areas located in valley regions are generally underlain by Quaternary age alluvial deposits containing sand and gravel, but resource evaluations cannot be made because of inadequate subsurface data. MRZ-3 areas located in hilly mountainous terrane (e.g. Baldwin Hills, Santa Susana Mountains) are generally underlain by Tertiary age sedimentary/volcanic deposits or crystalline basement rock (Plate 2.4).

Little is known about the overall potential of these rock units for use as aggregate based on existing data. However, a general discussion about some of these deposits is presented below. MRZ-3 areas that are potential sources of crushed rock resources are discussed in the section ALTERNATIVE SOURCES OF AGGREGATE, beginning on page 23.

Santa Susana Mountains

Tertiary sedimentary formations exposed in the eastern Santa Susana Mountains (Plate 2.4) contain conglomerate and sandstone deposits that are potential sources of aggregate. However, these rock units, which include the Towsley, Modelo, and Saugus Formations, have not previously been evaluated in detail for use as aggregate material. Conglomerate and sandstone contained in these units occur as massive, discontinuous beds and lenses that have been deformed and steeply folded in places, and show varying degrees of physical and chemical alteration as a result of weathering. Each of these factors would have to be carefully evaluated in order to determine whether there are any viable sources of aggregate contained within these deposits. Based on current knowledge, it is unknown whether materi-

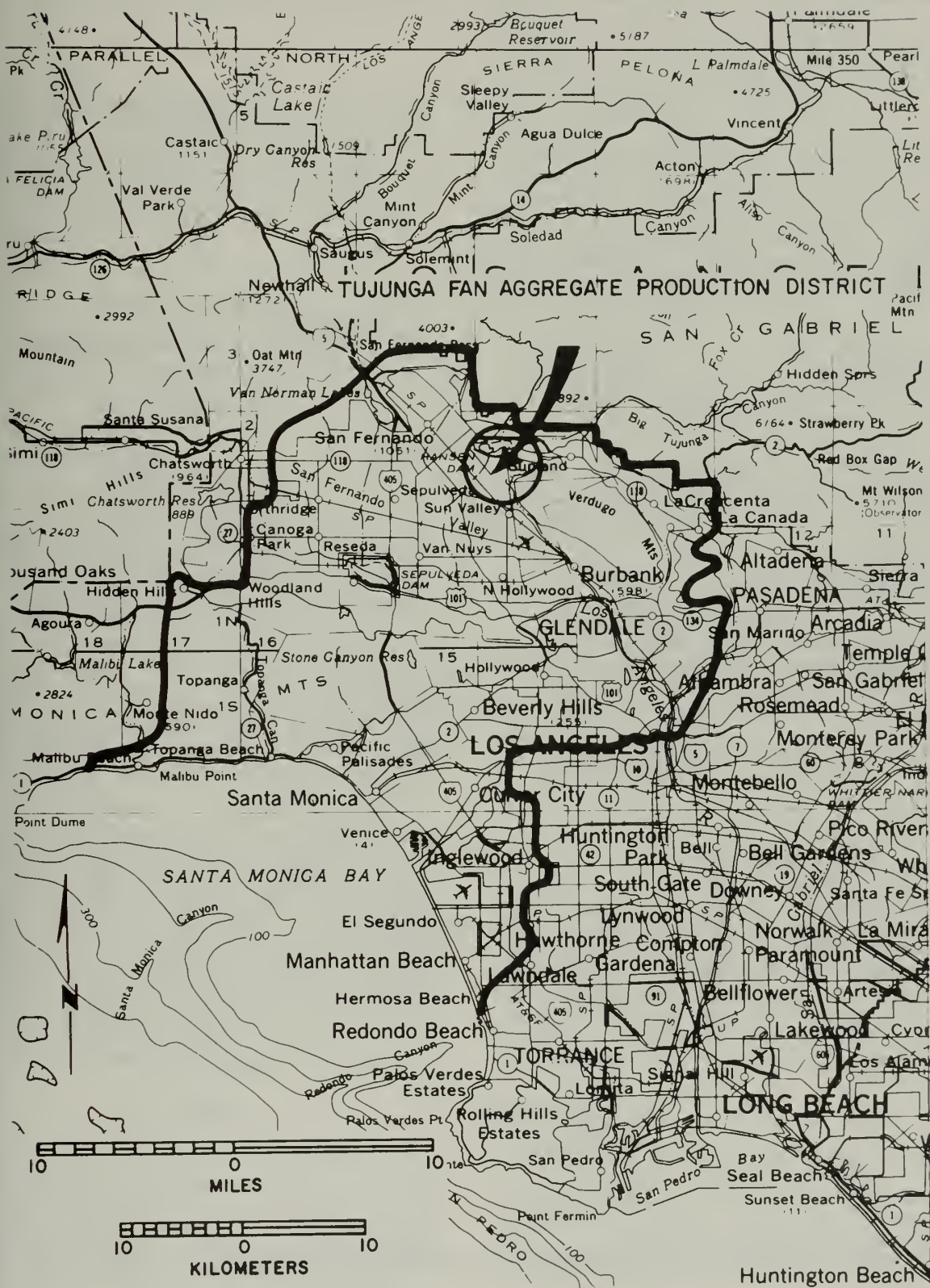


FIGURE 2.1 Map of the San Fernando Valley P-C region showing location on the Tujunga fan production district.

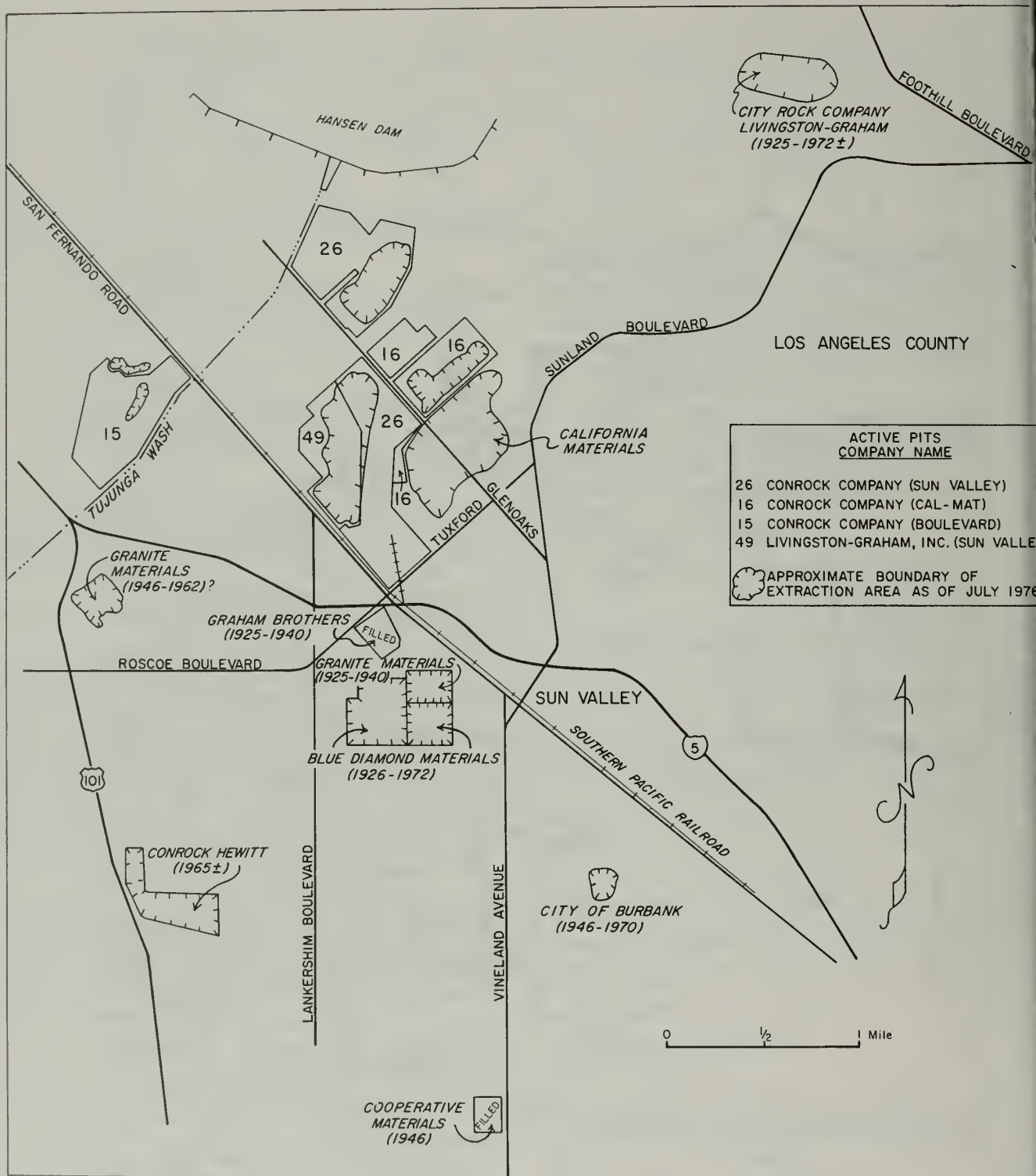


FIGURE 2.2 Sketch map of the Tujunga aggregate production district showing land owned or leased by aggregate companies as of July 1976. From Evans and others (1977).

ned in these deposits can be regarded as future sources of aggregate. Furthermore, land use factors in some cases could be the utilization of materials found to be acceptable.

Baldwin Hills

Deposits of sand and pebbly sands occur in Quaternary terrace deposits within the Baldwin Hills (Plate 2.4). Before these could be considered as a source of aggregate, they would have to be subjected to laboratory tests to determine their suitability for aggregate. Based upon field observation, it is unlikely that any significant amount of aggregate could be developed from this area.

EVALUATION OF AGGREGATE RESOURCES IN THE SAN FERNANDO VALLEY P-C REGION

Introduction

A analysis of aggregate supply in the San Fernando Valley P-C region is presented in this section of the report. The analysis is conducted on the basis of a quantitative evaluation of aggregate resources contained in urbanizing portions of the San Fernando Valley P-C region. A similar, but less detailed, evaluation of aggregate resources of adjacent P-C regions (San Gabriel Valley and Saugus-Newhall P-C regions in Los Angeles County, and Simi P-C region in Ventura County, Plate 1.2) is made to determine what effects these regions might have on the availability of aggregate in the San Fernando Valley P-C region. The latter evaluations are presented in the section ALTERATIVE SOURCES OF AGGREGATE, beginning on page 3.

Much of the Tujunga alluvial fan and Pacoima Wash areas have been classified MRZ-2 (Plate 2.3). By far, the bulk of the sand and gravel deposits contained within these classified areas are beneath already urbanized land. As a practical matter, these areas can be considered unavailable because they have already been committed to uses that preclude extraction of aggregate. Although aggregate resource measurements presented in this report are restricted to urbanizing areas not yet developed, it can be conservatively estimated that several hundred million tons of acceptable material lies beneath the urbanized portion of the area classified MRZ-2.

Data Base

For any appraisal of a resource to have credibility, it must be based upon sound data. If the data base is weak, the resource appraisal must indicate this fact and, conversely, if it is strong, it should also be noted. Terminology used to reflect the confidence level of the data base for this project has been adapted from U.S. Geological Survey Bulletin 1450-A (Appendix C). The terms *measured*, *indicated*, and *inferred reserves* and *resources*, as well as *speculative resources*, are used in the discussion which follows. For this project, *reserves* represents material believed to be acceptable for commercial use that exists within

property boundaries owned or leased by an aggregate producing company and for which permission allowing extraction and processing has been granted by the proper authorities. *Resources* include both *reserves* and similar potentially useable materials which may be mined in the future, but for which no use permit allowing extraction has been granted, or for which development has not been definitely established to be feasible based upon current technological or economic conditions.

Much of the resource evaluation that follows is based on drill hole records of variable reliability. These drill holes were made over a time span extending back to the early part of this century. They describe the types of earth materials (silt, sand, gravel, and bedrock types) encountered at various depths. The quality of drill hole descriptions range from poor to very good. Only drill hole records that contain descriptions judged to be acceptable for analysis were used in the present study.

Factors Considered in Calculation of Resources

The estimate of resources given here are for the non-urban portions of the San Fernando Valley P-C region (Plates 2.5 - 2.21). Parameters that were used in making these estimates include the following:

- (1) Material must meet the criteria described on page 16.
- (2) Combined clay and silt fraction must not exceed 25 percent by volume.
- (3) The lateral and vertical distribution of the mineral resource is determined on the basis of geologic projections from known sample sites, quarries, outcrops, and an understanding of the geological processes responsible for the formation of the deposit.
- (4) It is assumed that there is an average of .065 short tons of aggregate per cubic foot of material (15.4 cubic feet per ton).

Resource Sectors

All extractable sand and gravel deposits suitable for aggregate within urbanizing portions of the San Fernando Valley P-C region have been divided into four internally homogeneous sectors for the purpose of making resource estimates: Sector A - Tujunga Wash east of Hansen Dam; Sector B - Hansen Dam area; Sector C - the area southwest of Hansen Dam; and Sector D - Pacoima Wash (Plate 2.3). A tabulation of the calculated resources contained in these sectors is given in Table 2.3.

Sector A

Methods used to determine the amounts of aggregate resources within Sector A include: (1) deduction of configuration based on knowledge of the geologic processes responsible for formation of the aggregate resources; (2) evaluation of the past mining history within Tujunga Wash west of Foothill Boulevard; and (3) interpretation of records of drill holes located within and adjacent to the area.

Normally, a stream in a youthful stage of development will cut a channel that resembles a "V" or inverted triangle in cross

SECTOR	RESOURCES							TOTAL (rounded to near 10 million)
	USE PERMITTED RESOURCES (Reserves)			NON-PERMITTED RESOURCES				
	Measured	Indicated	Inferred	Measured	Indicated	Inferred	Speculative	
A East of Hansen Dam					120	30	150	300
B Hansen Dam						240	60	300
C Southwest of Hansen Dam	30	15		10		85		140*
D Pacoima Wash						7	20	30
TOTAL	30	15		10	120	365	230	770

TABLE 2.3 Aggregate Resources of the Son Fernando Valley P-C region (all numbers in million short tons). See Appendix C for definitions of terms in this table.

* Does not include 10 million tons of subeconomic resources (see page 25).

section, provided the stream flows over homogeneous earth materials. If relatively resistant rock or well-indurated alluvium underlies the stream course, the resulting shape of the channel cross section may vary from a modified triangle to a rectangle with vertical side walls.

Several lines of evidence support the interpretation of a "V" shaped or triangular cross section for the present stream-channel fill in deposits constituting this segment of the Tujunga alluvial fan. The existence of alluvial terraces adjacent to Tujunga Wash provides clear evidence that the drainage system in the area has been rejuvenated as a result of lowering of the local base level. The south side of this segment of the alluvial fan is bordered by bedrock of the Verdugo Mountains, which is generally much more resistant to erosion than the older alluvium bordering the deposits to the north. The greater rate of erosion of the less durable alluvium accounts for the modified "V" shape cross section of the Tujunga Wash channel.

Mining activities in the Tujunga Wash prior to 1969 provide evidence of a north-sloping channel wall along the south side of the wash. Aggregate was mined from a pit located on the south side of the wash about one-half mile west of Foothill Boulevard. "Hardpan" was encountered at a depth of about 20 feet on the south side of the pit. The depth of the "hardpan" floor steepened to 60 feet as excavation proceeded northward toward the center of the wash.

Sufficient subsurface data is not available to make a determination of the depth of the alluvial-filled channel within Tujunga Wash. Records indicate that some drill holes were placed at sites within the channel. Information provided by spatial distribution of the drill holes suggest a channel profile with an average depth of 80 feet. An alternative interpretation assumes a less likely average channel depth of 100 feet. This alternative interpretation is based on a single drill hole that penetrated alluvium to a depth greater than 100 feet. However, it is not known if the material penetrated is from a young channel or an older alluvial channel containing substandard aggregate.

Resources were calculated for Sector A using the material density factor of .065 tons per cubic foot. One hundred-twenty (120) million tons of aggregate are available as *indicated sources* in Sector A, assuming that the alluvium filled channel has a triangular cross section and an average depth of 80 feet.

If the depth extends to 100 feet, an additional 30 million tons of aggregate would be present. These are classified as *inferred resources* because there is less certainty of their existence.

An additional 120 million tons of aggregate may exist if the channel cross section is rectangular (vertical side walls extending to 80 feet). Should the channel depth extend to 100 feet instead of 80 feet, 30 million tons of aggregate could be added. Thus, a combined estimate of 150 million tons of aggregate

classified as *speculative resources* because an unrecognized geosetting is required for these deposits to be realized.

Sector B

Drill hole data and nearby bedrock exposures indicate that the bedrock surface beneath Sector B has an irregular configuration. Causes for this irregularity are not known. Factors that might be responsible for it might include faulting, continuation of adjacent bedrock slopes, or a combination of these. These factors, when considered along with drill hole data, suggest a general abrupt southwest steepening of the bedrock surface.

Drill holes that penetrated bedrock within and immediately adjacent to Sector B show that aggregate exists to depths ranging from approximately 60 feet to somewhat over 200 feet. Spatial distributions of these drill holes and the presence of nearby bedrock outcrops suggest that aggregate is present to an average depth of 100 feet. A less likely interpretation would extend this average depth to 125 feet.

Estimated 240 million tons of aggregate, classified as *inferred resources*, are present within Sector B, assuming that the depth of the deposit extends to 100 feet. In the less likely possibility that the average depth of alluvium extends to 125 feet, an additional 60 million tons of aggregate, classified as *speculative resources*, would be present.

Sector C

Aggregate produced within the San Fernando Valley P-C region comes from Sector C, where material has been mined to depths ranging from 60 feet to more than 200 feet. Exposures of bedrock in pits and information gathered from drill hole records indicate that aggregate exists at depths in excess of 550 feet in the southwestern part of the sector.

Estimates were made of the tonnage of aggregate resources contained beneath land in Sector C. These estimates are summarized in three categories.

Reserves contained beneath lands with use permits: Evaluation of confidential company records shows that approximately 45 million tons of aggregate reserves are present in Sector C. Thirty million tons of aggregate are classified as *measured reserves*, based on the numerous exposures of aggregate in production pits, drill hole data, and material test data. The remaining 15 million tons are classified as *indicated reserves* because fewer test data are available to place them into the higher category.

Resources contained beneath lands with use permits: Forty (40) million tons are present at depths ranging from 150 feet to 300 feet. These deposits are classified as *inferred resources* because sufficient information is not available to judge the quality of this material and special permits would be required before extraction could be allowed. Ten (10) million tons are at depths ranging from 300 feet to 500 feet. These deposits are classified as *inferred economic resources* (Appendix C) because it is anticipated that the presence of water will present restricting mining conditions that will possibly require the use of a dragline. Furthermore, special reclamation measures would be required once the aggregate became depleted. Because of these factors, it is questionable

that mining at these great depths would be economically feasible now or in the future.

Resources contained beneath lands without use permits: Ten (10) million tons of *measured resources* are located beneath right-of-ways for a high pressure gas line and a water conduit. The quality and quantity of this material is well established. However, special permits would be required in order to mine aggregate contained beneath the right-of-ways. Forty-five (45) million tons of *inferred resources* are estimated beneath lands without use permits, based upon interpretation of logs of nearby drill holes and observations from existing pits. These resources occur to a depth of about 250 feet.

Sector D

All resources underlying Sector D are located within the alluvial channel beneath Pacoima Wash (Plate 2.3). The overall depth of this channel has not been defined, although, as mentioned previously (see p. 16), a single drill hole located in the wash south of Lopez Dam passed through 50 feet of alluvium. However, it is not known if the entire 50 feet consists of younger alluvium, since the channel breaches older alluvium.

Resources for Sector D were estimated using assumptions similar to those used to estimate resources in Sector A. Seven (7) million tons of aggregate are available, based on a triangular-shaped channel cross section with a depth of 25 feet (average depth between zero feet and the 50 feet of alluvium penetrated by the drill hole south of Lopez Dam). These are classified as *inferred resources* because of the paucity of subsurface data.

If a depth of 50 feet, as indicated by the single drill hole south of Lopez Dam, is assumed, an additional 7 million tons of aggregate would be available. These are classified as *speculative resources*. An additional 14 million tons of aggregate may exist if the channel cross section is assumed to be rectangular and extends to a depth of 50 feet. These 14 million tons are also classified as *speculative resources*. The total of all *speculative resources* for Sector D is about 21 million tons.

ESTIMATED 50-YEAR CONSUMPTION OF AGGREGATE

The total projected consumption of aggregate in the San Fernando Valley P-C region for the next 50 years is estimated to be 230 million tons (Table 2.4).

Population Records

Aggregate production and population records were compiled for the years 1960-1979 for the San Fernando Valley P-C region (Figure 2.3). Records for the years prior to 1960 are in most cases incomplete. Records of aggregate production and population from 1960 to 1976 were also compiled for the adjacent P-C regions (Figures 2.4 - 2.6). Population projections to the year 2030 are presented on Figure 2.7.

Per Capita Consumption Rates

The San Fernando Valley P-C region maintained an average per capita consumption rate of about 1.6 tons of aggregate per

YEARS	SAN FERNANDO VALLEY P-C REGION		SAN GABRIEL VALLEY P-C REGION		SIMI P-C REGION		SAUGUS-NEWHALL P-C REGION	
	Average Population (Millions)	Aggregate Consumption (mt)**	Average Population (Millions)	Aggregate Consumption (mt)	Average Population (Millions)	Aggregate Consumption (mt)	Average Population (Millions)	Aggregate Consumption (mt)
1980-1985	2.74	21.92	3.68	82.80	.27	6.75	.080	4.96
1985-1990	2.80	22.40	3.74	84.15	.31	7.75	.087	4.34
1990-1995	2.86	22.88	3.82	85.95	.34	8.50	.092	5.70
1995-2000	2.91	23.28	3.87	87.07	.37	9.25	.095	5.89
2000-2005	2.95	23.60	3.92	88.20	.41	10.25	.098	6.08
2005-2010	2.97	23.76	3.96	89.10	.44	11.00	.104	6.45
2010-2015	2.99	23.92	4.01	90.23	.47	11.75	.110	6.82
2015-2020	3.01	24.08	4.05	91.12	.51	12.75	.117	7.25
2020-2025	3.03	24.24	4.09	92.03	.54	13.50	.122	7.56
2025-2030	3.05	24.40	4.13	92.92	.57	14.25	.127	7.87
TOTAL		234.00		884.00		106.00		63.00

* Aggregate Consumption = population (5 year average) x 5 year per capita consumption.

** mt = million tons

TABLE 2.4 Projected aggregate consumption to the year 2030 for the San Fernando Valley, San Gabriel Valley, Simi, and Saugus-Newhall P-C regions

person per year between 1969 and 1974 (Figure 2.8). The per capita consumption rate was combined with the population projection for the San Fernando Valley P-C region in order to estimate aggregate consumption needs to the year 2030 (Table 2.4). Similar estimates were made for the adjacent P-C regions (Figure 2.8), although more thorough analyses of projected per capita consumption rates will be made as the adjacent P-C regions are studied in detail.

Population and dwelling unit densities

Population and dwelling unit densities of the San Fernando Valley P-C region appear to be relatively high when compared to those of the adjacent P-C regions (Figures 2.9 and 2.10). The relatively high densities of the San Fernando Valley P-C region reflect the more mature urban area conditions (limited growth space) of the western Los Angeles basin - San Fernando Valley metropolitan areas. The relatively low per capita consumption rate of 1.6 tons per person per year in the San Fernando Valley P-C region, compared to those of adjacent P-C regions (Figure 2.8), is assumed to represent established maintenance levels (urban maturity) of the P-C region. This conclusion is based on comparisons of data from the six P-C regions in the greater Los Angeles Area.

Factors affecting per capita consumption rates

Per capita consumption of aggregate has varied with time and is different in each P-C region (Figure 2.8). Several factors, such as changes in urban growth with time, relative degrees of urban maturity, and major construction projects (e.g. freeways), could account for the variations and differences.

The San Fernando Valley P-C region per capita consumption rate is not likely to change significantly in future years unless unforeseen events occur, such as massive urban renewal or disaster reconstruction. Such events would result in a sharp increase in per capita consumption of aggregate during the period of active reconstruction. The amount of aggregate needed in addition to the steady state consumption of 1.6 tons per person per year would depend upon the extent and duration of reconstruction. Per capita consumption would probably then gradually return to a maintenance level equivalent to that which existed before reconstruction began.

The average per capita consumption rate over the next 50-year period in the San Fernando Valley P-C region could increase as much as 100 percent as a result of massive reconstruction or other unforeseen circumstances such as extensive

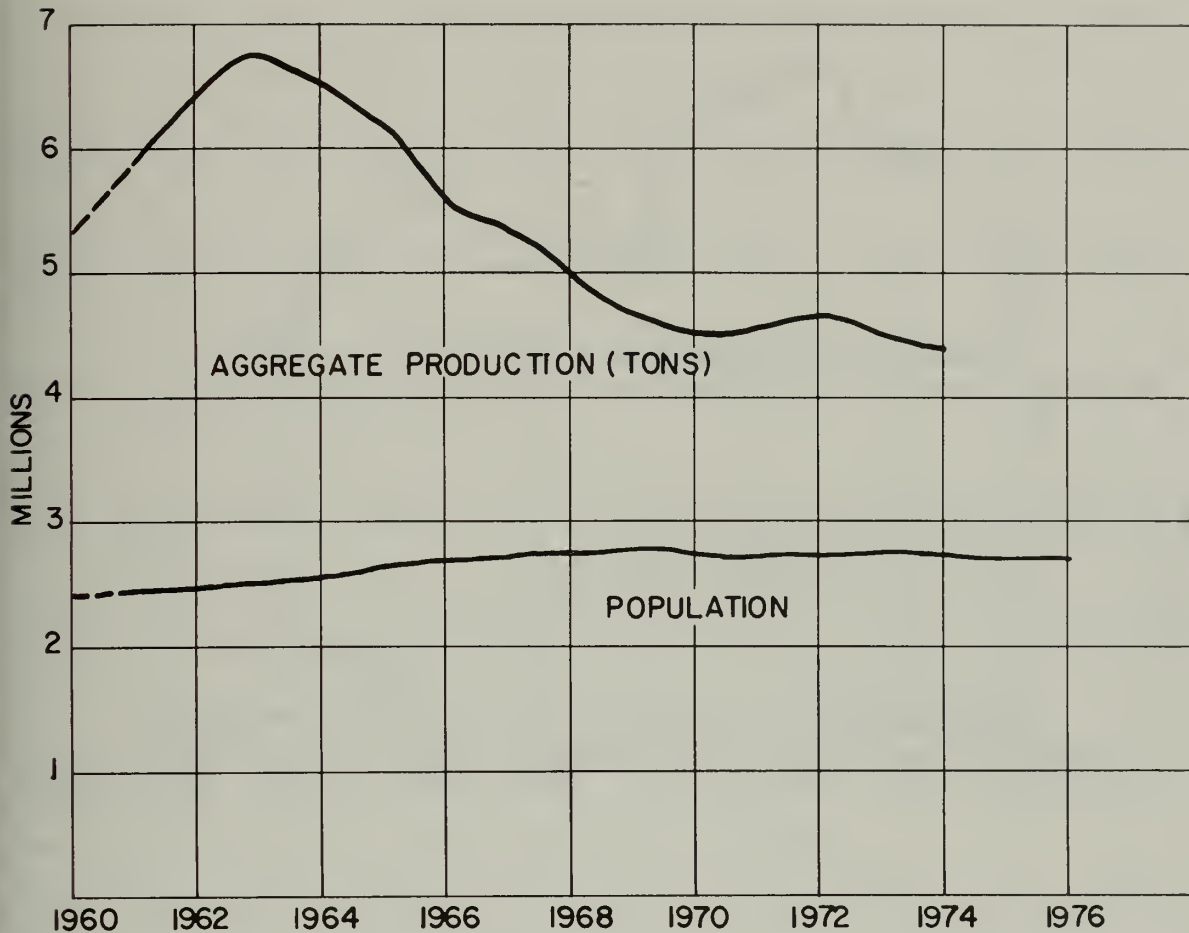


FIGURE 2.3 San Fernando Valley P-C region: population and aggregate production record for years 1960-1976.

quake damage. Annual per capita aggregate consumption in the San Fernando Valley P-C region peaked during a period of rapid urbanization in 1963 at about 3 tons per person (Figure 2.3), almost double that of the projected rate. If 3.2 tons per person were used as the projected annual per capita consumption, then about 460 million tons of aggregate would be needed to fill the requirements in the San Fernando Valley P-C region over the next 50-year period.

ALTERNATIVE SOURCES OF AGGREGATE

Introduction

Potential sources of aggregate, in addition to the alluvial sand and gravel deposits described in Sectors A, B, C, and D (Plate 1), occur in areas within and near the San Fernando Valley P-C region. These sources include resources in adjacent P-C regions, areas underlain by crystalline rock, older Cenozoic sedimentary deposits, and offshore sand and gravel deposits.

Except for the resources in adjacent P-C regions, too little is known about the physical and chemical rock qualities (see Part I, OVERVIEW OF AGGREGATE) of alternative sources of

aggregate to permit even crude resources estimates. However, a general discussion about the potential resources, their occurrence, and factors controlling their utilization is presented in the following section.

Sand and Gravel Resources of Adjacent P-C Regions

Resource estimates

Resource estimates given in this report for P-C regions adjacent to the San Fernando Valley P-C region represent modifications of data taken from California Division of Mines and Geology Open-file Report 77-1LA (Evans and others). The *reserve* estimates are current to January 1979. The *resource* estimates were made using published geologic maps with reconnaissance field checking, including visits to sand and gravel plants operating in 1978. The following parameters were assumed in estimating the largest part of the resources:

- (1) Material density ranges from .060 to .065 short tons per cubic foot.
- (2) Waste does not exceed 25 percent.
- (3) Technology is presently available for economic extraction.

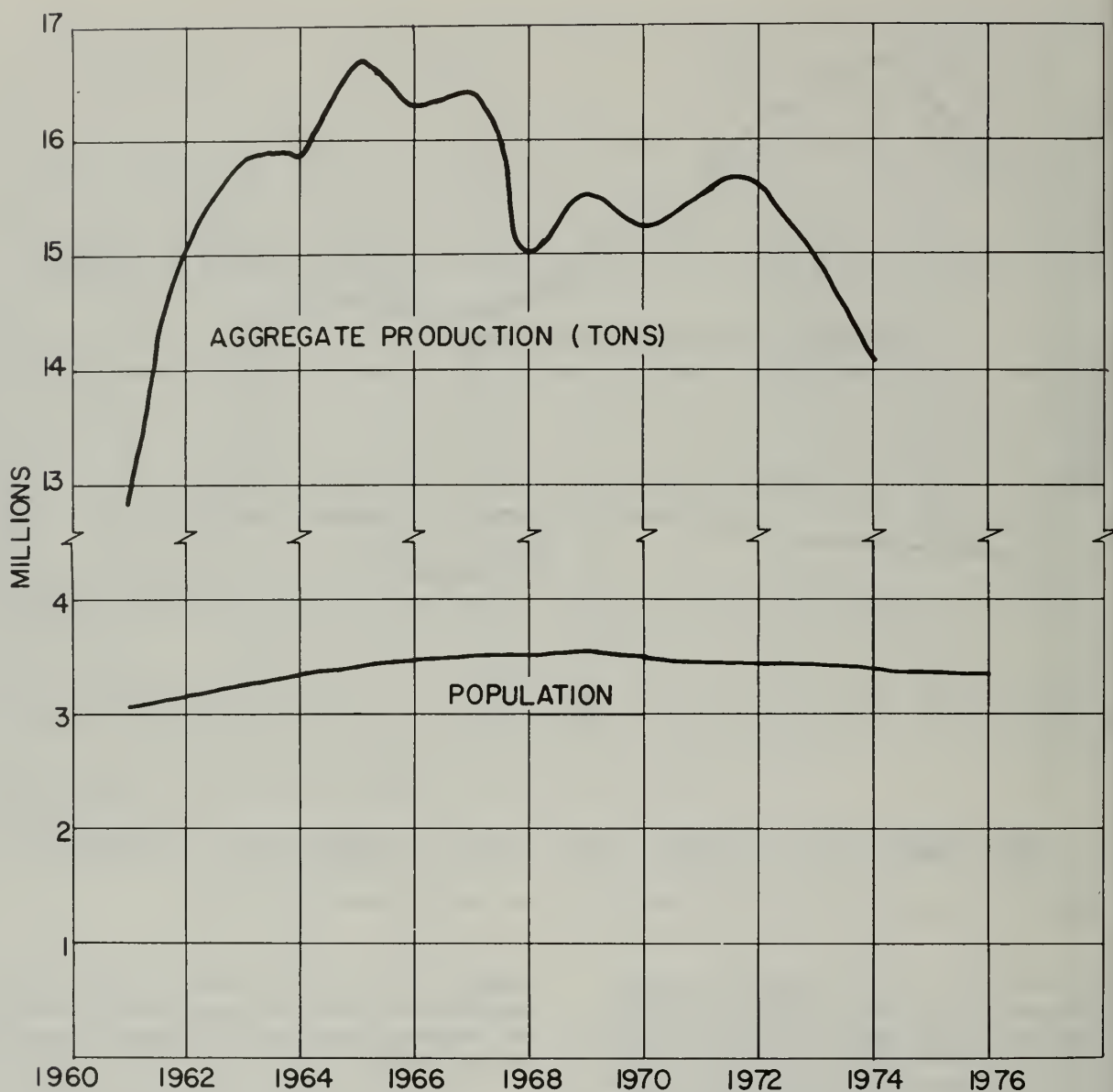


FIGURE 2.4 San Gabriel Valley P-C region: population and aggregate production record for years 1960-1976.

- (4) Estimates were limited to areas which are not urbanized and for which mining is still a possible interim land use.

The estimated resources of the adjacent P-C regions are presented on Table 2.5.

Localities marked as PRZ-2 (Preliminary Resource Zone) on Plate 2.1 contain all of the known tentative MRZ-2 resource areas in the adjacent P-C regions. Changes will most likely be made both in the resource estimations and the outlines of the zones when more detailed studies are made.

Estimated 50-year consumption of aggregate in adjacent P-C regions

Estimated 50-year aggregate needs for adjacent P-C regions are presented on Table 2.4. Comparison of Table 2.4 and 2.5

shows that the projected 50-year total consumption of aggregate for each of the three adjacent P-C regions is less than respective total *resource* estimates. Additionally, the *resources* alone in the San Gabriel Valley and Simi P-C regions are sufficient to supply the 50-year projected needs for aggregate resources within these two P-C regions are not utilized to future requirements, these P-C regions will be forced to acquire aggregate elsewhere. In such an event, it is likely that a negative impact would occur upon the San Fernando Valley region's supply of aggregate.

Crushed Rock Sources as Alternative

Metamorphic, granitic, and volcanic rocks are exposed large areas within and near the San Fernando Valley P-C region, principally outside of the OPR boundaries of urbanized areas (Plate 2.4). In addition, there are areas underlain by older C

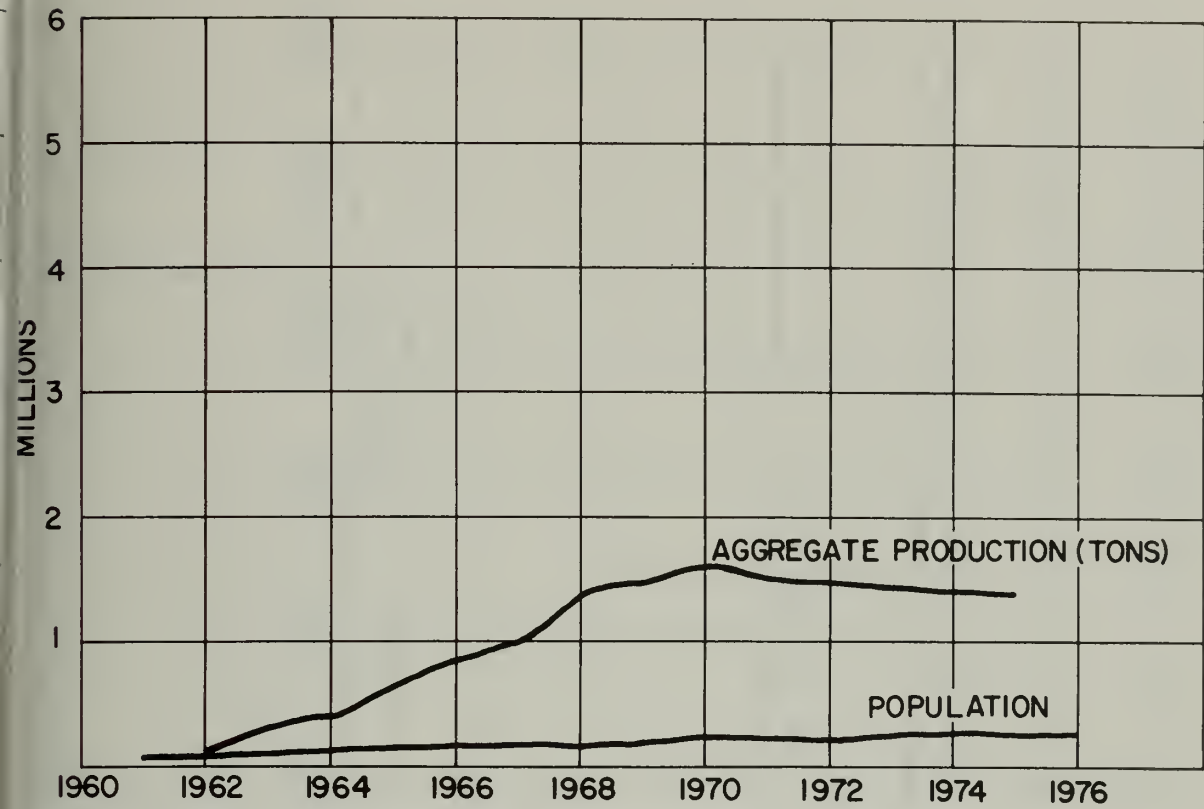


FIGURE 2.5 Simi P-C region: population and aggregate production record for years 1960-1976.

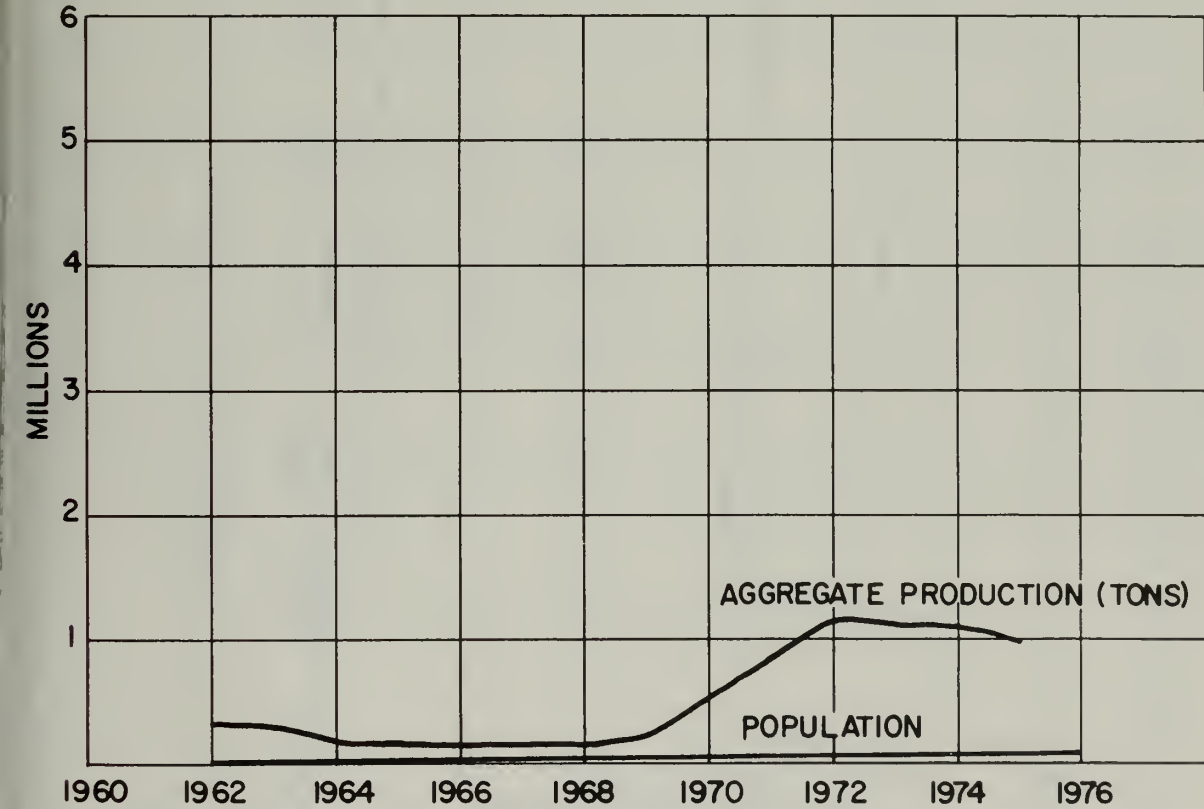


FIGURE 2.6 Soqugs-Newholl P-C region: population and aggregate production record for years 1960-1976.

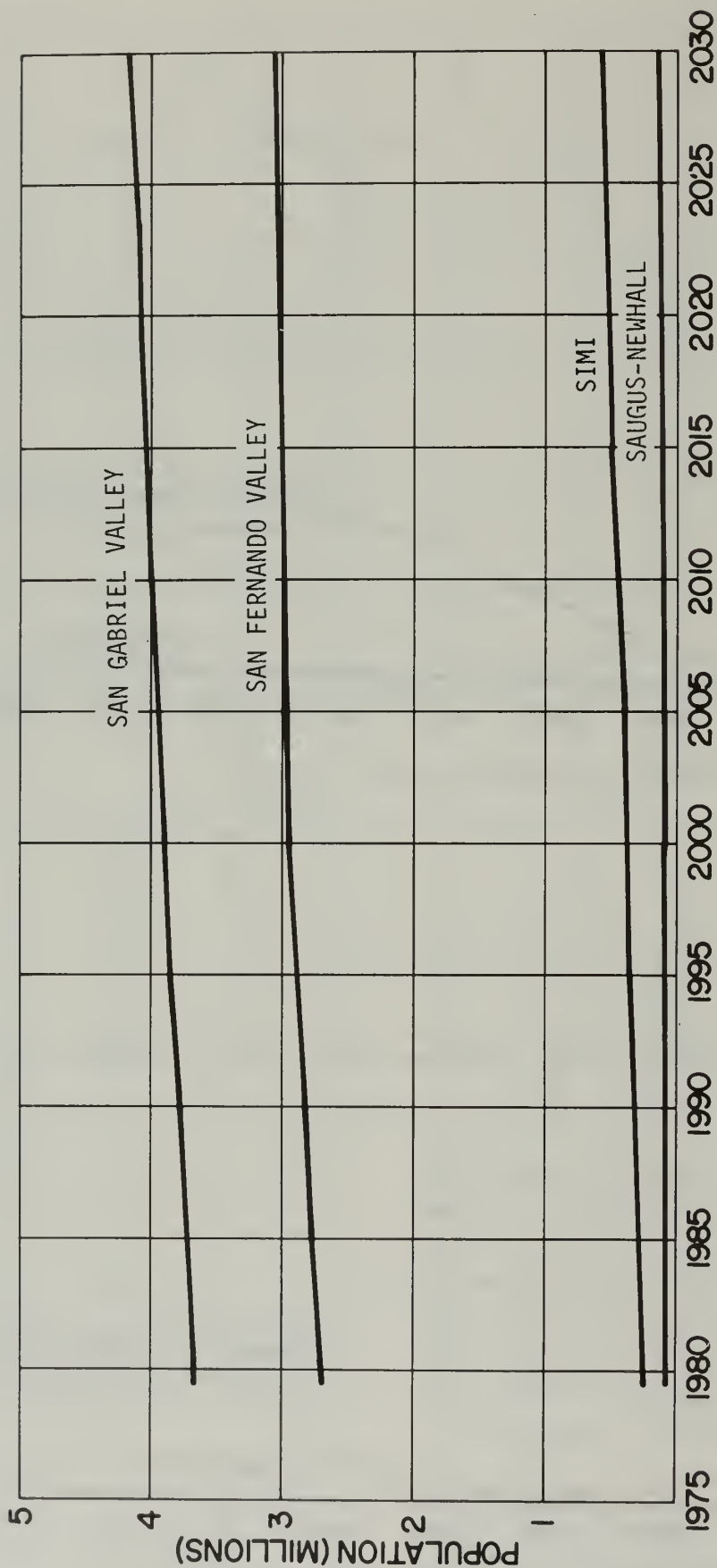


FIGURE 2.7 Projected populations of the San Fernando Valley, San Gabriel Valley, Simi, and Saugus-Newhall P-C regions to the year 2030.

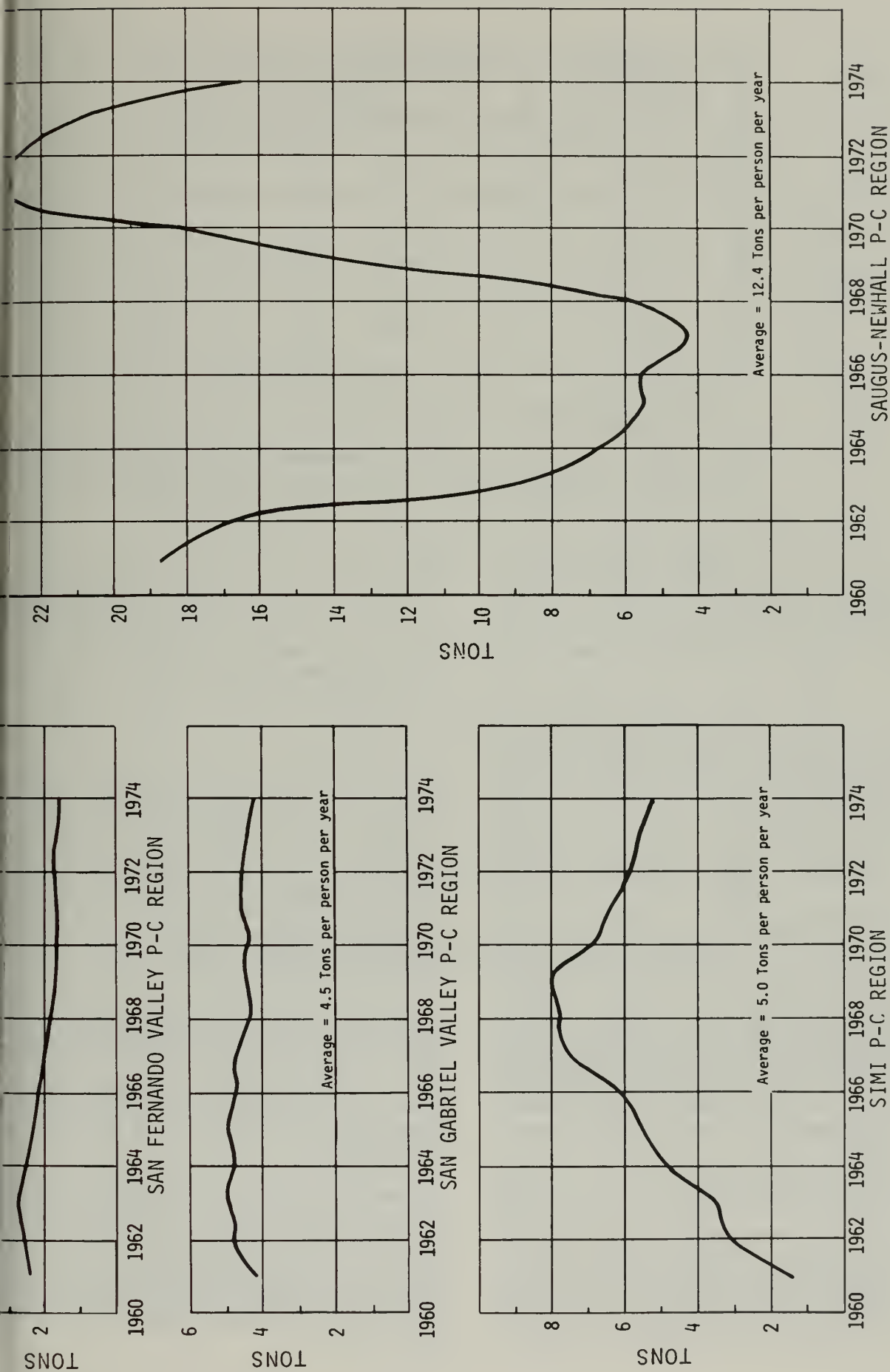


FIGURE 2.8 Annual per capita consumption of aggregate in the San Fernando Valley, San Gabriel Valley, Simi, and Saugus-Newhall P-C regions for years 1961-1974.

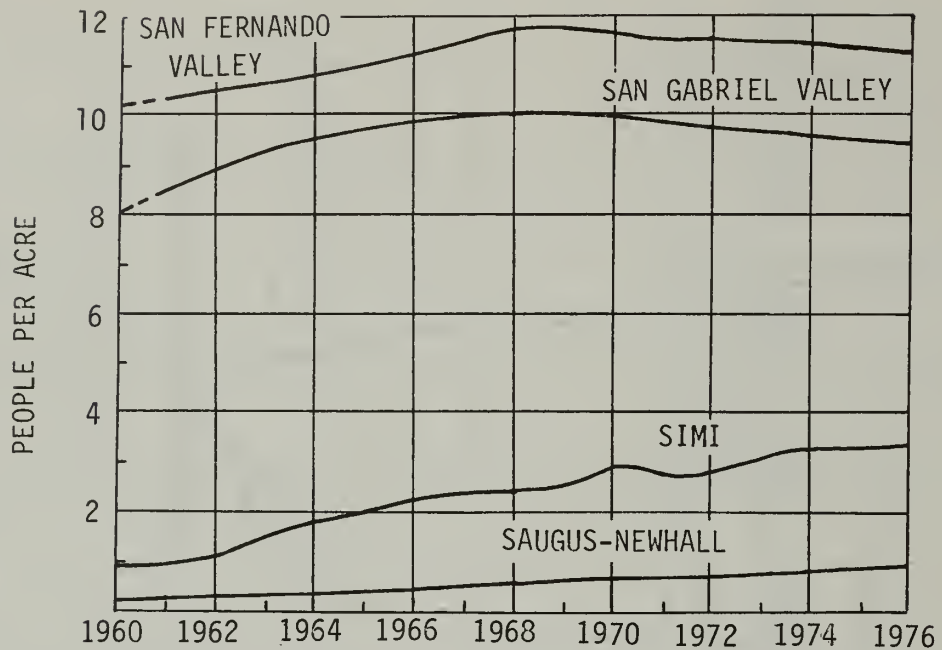


FIGURE 2.9 Comparison of population densities for San Fernando Valley, San Gabriel Valley, Simi, and Saugus-Newhall P-C regions for years 1960-1976.

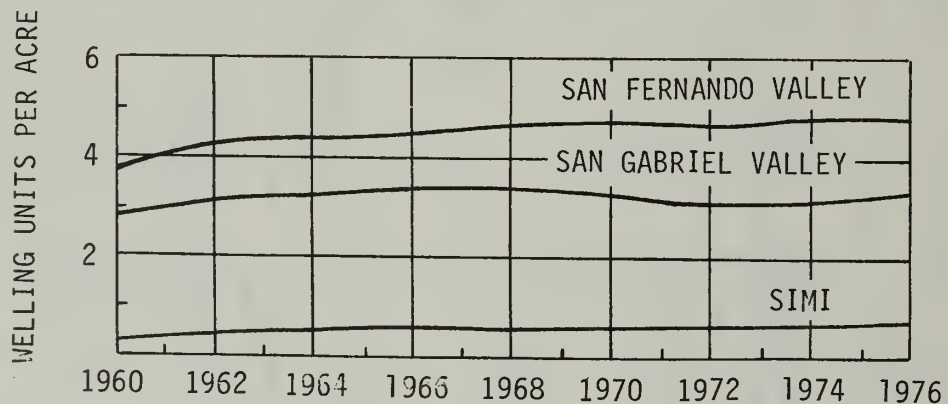


FIGURE 2.10 Comparison of dwelling unit densities for San Fernando Valley, San Gabriel Valley, and Simi P-C regions for years 1960-1976 (Data unavailable for Saugus-Newhall).

zoic sedimentary rocks. These areas are potential sources of crushed rock for use as aggregate material. Several of these prospective resource areas are located within the San Fernando Valley P-C region and are zoned MRZ-3. However, most prospective alternative resource areas occur within the unclassified area of the San Gabriel Mountains north of the San Fernando Valley P-C region.

Metamorphic and granitic rocks

Metamorphic and granitic basement rocks comprise the San Gabriel and Verdugo Mountains, the San Rafael Hills, and portions of the Santa Monica Mountains (Plate 2.4). However, not all of the exposed basement rock is suitable for aggregate. Whether or not basement rock in a particular locality is acceptable for use as construction material depends on a number of

factors, such as (1) original rock characteristics (primary durability), (2) degree of weathering (secondary durability), (3) depth of weathering (overburden factor), (4) mineralogy (relative rock, rock chemical durability), (5) texture (crushed particle shape and size), (6) degree of fracturing (rock removal), and (7) end uses (Portland cement concrete, asphaltic concrete base, or subbase).

The P.W. Gillibrand Company presently quarries rock of the San Gabriel Mountains basement complex near Soledad, California for use in asphaltic concrete and as base material (see locality No. 39, Figure 1.2). The material extending from the weathered zone to a depth of ten to fifteen feet is weak and unsuitable for use as aggregate (Evans and others, 1977). This rock is durable enough to require blasting for removal at depths below twenty feet.

PRODUCTION-CONSUMPTION REGION	INFERRED RESERVES (Million Tons)	INFERRED RESOURCES (Million Tons)	TOTAL (Million Tons)
San Gabriel Valley	235	1,750	1,985
Simi	45	815 *	860
Saugus-Newhall	205	230	435
CATEGORY TOTAL	485	2,795	
TOTAL RESERVES-RESOURCES, San Gabriel Valley, Simi, and Saugus-Newhall:			3,280

* Estimated that 195 million tons of these inferred resources consist of coarse material.

2.5 Aggregate resources of the San Gabriel Valley, Simi, and Saugus-Newhall P-C regions.

The amount of material contained in the San Gabriel Mountains is believed to be very large. However, exploration, including detailed field mapping and testing, is necessary to delineate areas where basement rocks of suitable quality occur. The fact that much of the area underlain by basement rock is not presently open to mining activity also limits the amount of useable material.

Tertiary volcanic rocks

Tertiary volcanic rocks are exposed in the central and western portions of the Santa Monica Mountains and in a few isolated areas in the San Gabriel Mountains (Plate 2.4). Some of the volcanic rocks are crystalline basalt, which might be crushed and processed into aggregate material if the rock is of acceptable quality. Basaltic rocks exposed in parts of the Santa Monica Mountains have not been thoroughly evaluated for use as aggregate material. However, cursory field examination and petrographic analysis of several rock samples indicate that rocks in this area have undergone widespread zeolitization. Basalts with high zeolite content are potentially reactive in concrete and, therefore, unsuitable for use as aggregate. Other deuteric rock alterations also could degrade the durability of the material. Exploration and testing is necessary in order to delineate any potential crushed rock resource areas in this terrane.

Mesozoic and Cenozoic sedimentary rocks

Conglomerate and other clastic deposits occur in Mesozoic and Cenozoic age sedimentary formations exposed in areas within and adjacent to the San Fernando Valley P-C region (Plate 2.5). Some deposits in the above rock units are indurated, have a desirable grain-size distribution, and contain abundant coarse material. Therefore, crushing and washing of the material is necessary. The P.W. Gillibrand Company and the Curtis Construction Company presently mine and process bedrock deposits in the Miocene Mint Canyon Formation near Soledad Canyon (Plate 2.5, Plant Nos. 30 and 39, Figure 1.2). Rocks of the Mint

Canyon Formation at these localities are predominantly conglomerates which contain about 60 percent coarse material composed mostly of gabbro and granitic gneiss rock fragments. The aggregate is sold for use in Portland cement and asphaltic concrete, and also as base and fill.

Land use factors

Areas in and adjacent to the San Fernando Valley P-C region that are underlain by potential crushed rock resources fall within the jurisdiction of the County of Los Angeles, the cities of Los Angeles, Glendale, Burbank, Pasadena, and La Canada-Flintridge, the U.S. Forest Service, and the U.S. National Park Service. Whether or not suitable rock materials contained in these areas would be available for extraction depends on current and future land use policies established by these agencies.

Verdugo, San Rafael and Eastern Santa Monica Mountains: Land use policies currently being developed will probably preclude mining activity in much of the area covered by the Verdugo Mountains, the San Rafael Hills, and the eastern Santa Monica Mountains. The cities of Burbank and Glendale, under whose jurisdiction most of the San Rafael Hills and Verdugo Mountains fall, have been actively pursuing public land acquisition in those regions for recreational and general open space purposes. These acquisitions have been made possible, in part, by the Federal Open Space Grant program.

The City of Los Angeles, which has jurisdiction in the northern portion of the Verdugo Mountains and the eastern Santa Monica Mountains, has not been actively pursuing public land acquisition under the federal government program. Most of the undeveloped lands in these areas of Los Angeles are privately owned and have been designated as minimum or low density residential areas. The county of Los Angeles has designated some open space portions of the eastern Santa Monica Mountains, as well as parts of the Verdugo Mountains and San Rafael Hills, as "Significant Ecological Areas" in its 1979 general plan.

An active movement is currently being undertaken to preserve the remaining undeveloped lands in the San Rafael Hills and Verdugo Mountains by a statewide organization named Small Wilderness Area Preservation (SWAP). This group has received general support from the cities of Burbank, Glendale, and Los Angeles in their attempts to preserve the natural environment of these lands. Furthermore, Senate Bill 887, introduced by Senator Newton Russell on March 26, 1979, would appropriate \$25,000 to the California Department of Parks and Recreation to study the feasibility of acquiring the San Rafael Hills and Verdugo Mountains for inclusion within the State Parks System. These developments suggest that opportunities for future land use permits in these areas may be limited.

Western Santa Monica Mountains: Most of the basaltic rock exposed in the Santa Monica Mountains lies within the proposed boundaries of the Santa Monica Mountains National Recreation Area (NRA), established November 10, 1978 with passage of Public Law 95-625, Section 507 (Plate 1.2). The NRA is administered by the U.S. Department of the Interior through the National Park Service. Public Law 95-625 mandates that "The Secretary shall manage the recreation area in a manner which will preserve and enhance its scenic, natural and historical setting and its public health value as an airshed for the Southern California metropolitan area while providing for the recreational and educational needs of the visiting public." Although the enabling legislation does not address mining activity specifically, Section 507(i) states: "In the administration of the recreation area, the Secretary may utilize such statutory authority available for the conservation and management of wildlife and natural resources as appropriate to carry out the purpose of this section. The fragile resource areas of the recreation area shall be administered on a low-intensity basis, as determined by the Secretary." Opportunities for future mining activity in this area, too, seem conjectural at best.

San Gabriel Mountains: Almost all of the crystalline basement rock exposed in the San Gabriel Mountains in and adjacent to the San Fernando Valley P-C region falls within the boundaries of the Angeles National Forest, Tujunga District (Plate 1.2). There are some isolated patches of privately owned land within the national forest. On federal lands, aggregate material is categorized as a saleable mineral. Mining of these materials in the national forest is subject to approval by the Forest Service following an environmental assessment of the proposed operation.

Most of the area in the Tujunga District of the Angeles National Forest has been withdrawn from mineral location and entry, mostly under the Angeles National Forest Minerals Withdrawal Act of 1928 and Public Land Order 4355. This law was enacted to conserve water resources and to encourage reforestation of the watersheds of Los Angeles County. These lands are withdrawn from appropriation under the mining laws of 1872, but leasing mineral-land and selling materials are still permitted as long as these activities are in support of programs conducted by the Department of Agriculture. Activities in support of Department of Agriculture programs are enumerated in forest land multiple-use plans established for each national forest and for each forest district.

The multiple-use plan for the Tujunga District of the Angeles National Forest was approved in February 1971. This plan divides the district into several zones, emphasizing various land

use activities in each. Forest Service lands between the San Fernando Valley and the main ridge forming the Santa Clara divide are included in the zone referred to as the "Front Country Zone." Mining opportunities in this zone appear unlikely, but the current multiple use plan, since recreation and preservation of the area's scenic values are emphasized. However, mineral development has been given some emphasis in the Interior Zone, which covers the back slope of the Santa Clara River divide. Part of the P.W. Gillibrand mining operation mentioned earlier takes place within this zone under contract agreement with the U.S. Forest Service. However, transporting material from the "Interior Zone" to the San Fernando Valley P-C region poses problems (see next paragraph). An updated multiple use plan for the Tujunga District is scheduled for completion in 1983.

Transportation factors

Transportation generally has a restrictive effect on the utilization of available mineral resources, particularly bulky, low value commodities such as aggregate material. Both haulage distance to the market area and proximity of production sites to useable transportation routes can determine whether a mine locality is a viable source of raw material. For example, existing and potential sources of aggregate located in the "Internal Zone" of the Tujunga Forest District might not be available to the San Fernando Valley P-C region because of high costs in transporting the material between 20 and 40 miles to the market. Transportation in general would restrict mining aggregate in the San Gabriel Mountains because not only are existing routes limited in number, but the adequacy of most of these routes for increased truck traffic is also questionable. Increased utilization of the railroad system, however, could lower transportation costs and thereby increase competitive haulage distances.

Environmental factors

Major environmental factors that must be addressed in evaluating mining and processing aggregate material are vibration and air quality, operational noise level, reclamation of mineral land, and esthetics. The aggregate industry must meet regulatory requirements at the city, county, state, and federal levels to abate and prevent degradation of the environment. Specific environmental concerns can vary from one locality to another depending on the nature of the surrounding environment. For instance, environmental issues regarding aggregate operations in urbanized areas are often raised by people in the surrounding residential sector. Most concerns generally relate to dust, noise (blasting), truck traffic resulting from plant operations. In unpopulated, undeveloped areas, such as the San Gabriel Mountains, esthetics, quality, noise, and water pollution might receive greatest concern.

Conclusions regarding crushed rock alternative

Numerous areas within and near the San Fernando Valley P-C region are underlain by rock bodies that might be alternative sources of aggregate material. However, most of this material is unavailable because of factors such as rock quality, economics, access, land use policies, and environmental concerns. Consequently, land use planners and regulators should not expect nearby alternative sources of aggregate material to supplement or replace the resources delineated in Sectors A, C, or D unless conditions change (Plate 2.3). Some accept

hard rock bodies may exist in areas more suitable for ("Interior Zone" of Tujunga Forest District), but inaccessibility and long haulage distances to consumption regions are problems that would probably be very costly to deal with.

Offshore Sediment Deposits as Alternative Sources

Sand and gravel has been successfully mined for several years from marine sources, notably offshore from the United Kingdom, the Virgin Islands, and the Bahama Islands. There are a number of offshore localities adjacent to the Los Angeles area that contain deposits of aggregate. Deposits that have been most extensively studied consist of a variety of grain sizes ranging from sandy mud to gravel.

San Monica Bay

Investigators from the Department of Geology of the University of Southern California (Dr. R.H. Osborne) have identified a deposit of sand and gravel located about a mile offshore from San Monica in water depths of less than 15 fathoms (90 feet). The deposit is estimated to contain at least 100 million cubic feet of aggregate (approximately 150 million tons). Most of the material is interpreted to be sand-size sediment with only moderate amounts of pebbles and cobbles. The geometry of the deposits has not been sufficiently outlined to define its thickness or areal configuration.

San Pedro area

Another aggregate deposit has been identified by University of Southern California geologists offshore from San Pedro between San Pedro and Newport Beach in water depths ranging from 10 to 30 fathoms (30-90 feet). Core samples collected from this deposit exhibit a higher percentage of fine particles than those collected from the Santa Monica Bay location mentioned previously. Several million tons of aggregate are believed to exist offshore from San Pedro, based on the amount of sampling to date. However, the economic feasibility, limited use of material, and environmental concerns regarding mining activity in San Pedro Bay probably will preclude development of these deposits.

Offshore islands

Several deposits of aggregate are known to occur in the near-shore environment at shallow depths adjacent to Santa Catalina, Santa Clemente and Santa Barbara Islands. Neither the quantity nor the quality of these deposits has been assessed.

Economic viability factors

The feasibility of mining deposits of aggregate offshore from the Los Angeles area depends on a number of factors.

Considerable sampling and testing of the offshore deposits will be required to determine if the material is of sufficient quantity and quality to be of economic value. Tests will have to be made of processed marine sand and gravel to determine if salts are present that would render the material unsuitable for construction aggregate.

Studies need to be made to determine whether extensive

damage to marine life, the sea floor, or the surrounding beaches would result from marine mining activity.

- (3) The question of negative visual impacts from an offshore marine mining operation must be considered.
- (4) Permits to mine offshore must be obtained from the State Lands Commission.
- (5) Several other permit-agency approvals will be required to set up mining, processing, and on-shore storage facilities.
- (6) There must be sufficient economic incentive to justify the large capital outlays required to set up mining operations.
- (7) Dredging equipment must be acquired.

The number of requirements that have to be met in order to mine offshore aggregate deposits seems to be prohibitive. Although the offshore deposits might be regarded as potential alternative sources of aggregate for the San Fernando Valley P-C region, the eventual use of these materials is judged to be extremely problematical at this time.

CONCLUSIONS

Current reserves available within the San Fernando Valley P-C region are not adequate for supplying construction aggregate for the population of over 2.5 million inhabitants for the next 50-year period. Based upon a projected population increase for the region and a projected minimum per capita consumption rate of 1.6 tons per year, approximately 230 million tons of aggregate will be required to satisfy demand to the year 2030. If a maximum per capita consumption rate of 3.2 tons per year (see p. 22) is taken as an upper limit, then 460 million tons will be required. These two consumption factors are employed to bracket the 50-year need.

There are only 45 million tons of aggregate reserves within the San Fernando Valley P-C region (Table 2.3), an amount which is barely adequate for the next 10-year supply. An additional 95 million tons of aggregate resources can be extracted if the producing companies can (1) mine to greater depths within the Tujunga alluvial fan south of Hansen Dam, (2) recover material from under their present plant facilities, and (3) mine from beneath right-of-ways crossing their properties. Even with this amount, a shortfall of 90 to 320 million tons of aggregate (the range reflects the above minimum and maximum projected per capita consumption rates) will result, based on the 50-year estimate of requirements made in this report. However, technological or economic limitations make it very doubtful that all of these resources will be translated into reserves. For example, aggregate resources may exist beneath processing plant facilities. The cost of mining these aggregate resources can be economically impractical because plant facilities would have to be removed and relocated in order to gain access to the material. Nevertheless, companies mining aggregate should be encouraged to recover as much of these resources as possible, and governmental bodies should provide measures to facilitate aggregate recovery as a sound conservation measure.

It must be noted that initiation of the above resource recovery measures would not only create additional aggregate to fill future requirements, it would also result in larger, deeper pit areas once the material is removed. It must be noted as well that State law (Surface Mining and Reclamation Act of 1975; Appendix A-1) requires that mined lands be reclaimed to a usable condition which (1) is readily adaptable for alternative land uses and (2) creates no danger to public health or safety. It is possible that

with thoughtful planning, the mined-out areas can be reclaimed to a condition in which land use may be of a higher nature than the original use.

The Saugus-Newhall P-C region is the only P-C region adjacent to the San Fernando Valley P-C region that is projected to have a possible surplus of reserves for the next 50 years. However, even if all of the excess reserves from the Saugus-Newhall P-C region were diverted to the San Fernando Valley P-C region, a shortfall of from 43 million to 273 million tons of aggregate would remain (resources not considered).

The resources available in both the Saugus-Newhall and the San Gabriel Valley P-C regions are adequate to make up this shortfall. However, resources in the San Fernando Valley P-C region are the most logical to develop since they involve lower haulage costs. Furthermore, there is no assurance that the aggregate from adjacent P-C regions will be available for the San Fernando Valley P-C region.

RECOMMENDATIONS TO THE MINING AND GEOLOGY BOARD FOR DESIGNATION

To ensure that the San Fernando Valley P-C region will have an adequate supply of aggregate for the 50-year period under consideration, provisions should be made to designate Sectors A, B, C, and D (Plate 2.3) as having regional significance. If these

measures are taken, there would be about 540 million tons of aggregate available. Furthermore, additions to this figure can be made if any of the 230 million tons of *speculative reserves* later translates into *reserves*. This amount is more than adequate to supply the projected 50-year demand of 230-460 million tons and it would provide a contingency resource should the heavier demand than anticipated. Such contingencies might include demand from adjacent P-C regions that have depleted their aggregate resources; major urban renewal requirements and reconstruction that would follow in the wake of a major disaster, such as earthquake destruction.

ACKNOWLEDGMENTS

The California Division of Mines and Geology gratefully acknowledges the full cooperation of local government agencies, organizations, and aggregate producers called upon for information during the course of this study. Special thanks are extended to the Southern California Rock Producers Association, the Angeles County Flood Control District, the planning departments of Los Angeles County and the City of Los Angeles, the Southern California Association of Governments, and the California Department of Water Resources.

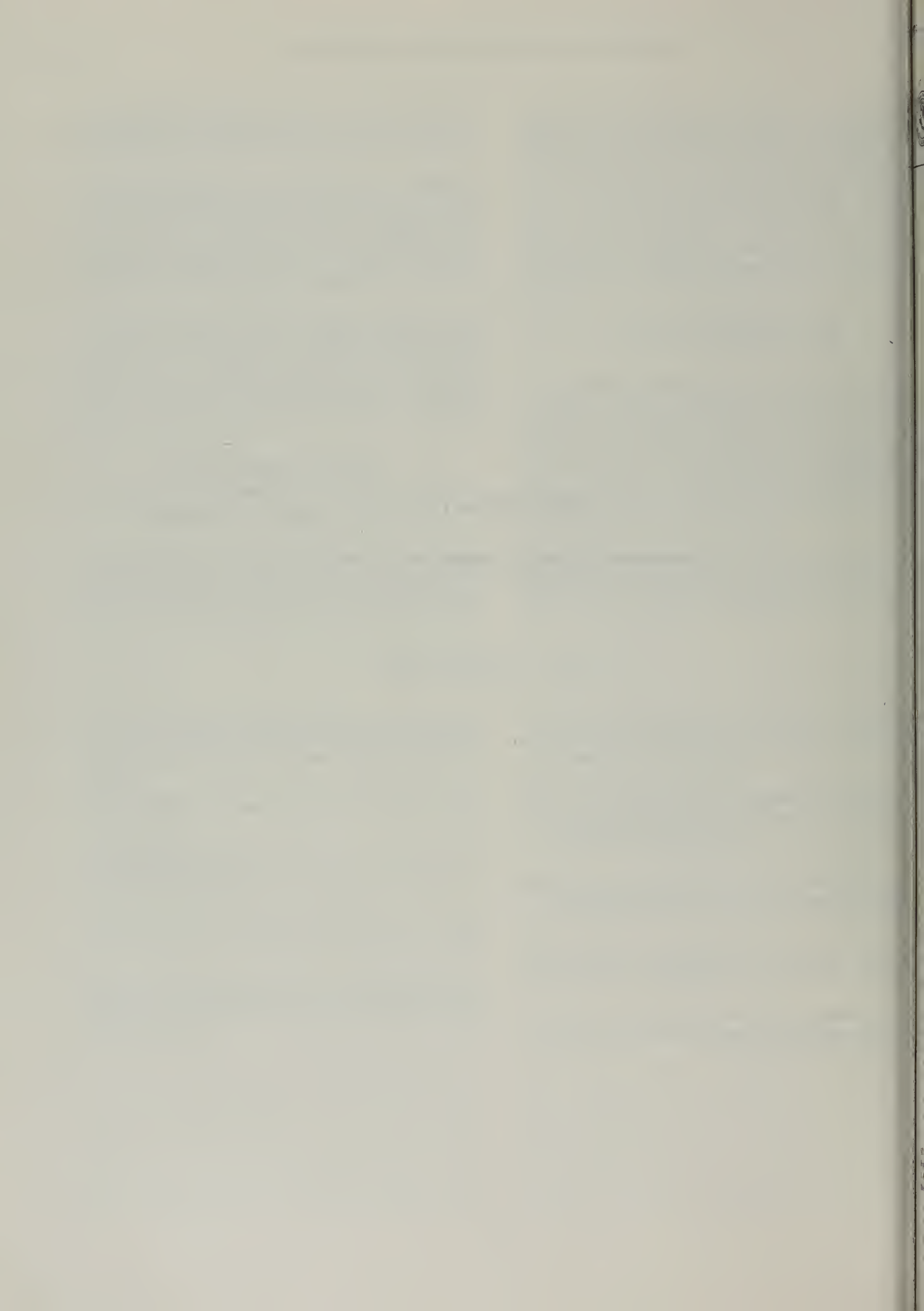
Frederick C. Kruger, Mining and Economic Geologist, retained as a consultant to review the methods and results of this study. Dr. Kruger's valuable commentary and suggestions were instrumental in completing the final report.

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APPENDIX A-1

Surface Mining and Reclamation Act of 1975




**CALIFORNIA DIVISION OF
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**CDMG
NOTE 50****SURFACE MINING AND RECLAMATION ACT OF 1975****Article 1. General Provisions**

2710. This chapter shall be known and may be cited as the Surface Mining and Reclamation Act of 1975.

2711. (a) The Legislature hereby finds and declares that the extraction of minerals is essential to the continued economic well-being of the state and to the needs of the society, and that the reclamation of mined lands is necessary to prevent or minimize adverse effects on the environment and to protect the public health and safety.

(b) The Legislature further finds that the reclamation of mined lands as provided in this chapter will permit the continued mining of minerals and will provide for the protection and subsequent beneficial use of the mined and reclaimed land.

(c) The Legislature further finds that surface mining takes place in diverse areas where the geologic, topographic, climatic, biological, and social conditions are significantly different and that reclamation operations and the specifications therefor may vary accordingly.

2712. It is the intent of the Legislature to create and maintain an effective and comprehensive surface mining and reclamation policy with regulation of surface mining operations so as to assure that:

(a) Adverse environmental effects are prevented or minimized and that mined lands are reclaimed to a usable condition which is readily adaptable for alternative land uses.

(b) The production and conservation of minerals are encouraged, while giving consideration to values relating to recreation, watershed, wildlife, range and forage, and aesthetic enjoyment.

(c) Residual hazards to the public health and safety are eliminated.

2713. It is not the intent of the Legislature by the enactment of this chapter to take private property for public use without payment of just compensation in violation of the California and United States Constitutions.

2714. The provisions of this chapter shall not apply to any of the following activities:

(a) Excavations or grading conducted for farming or on-site construction or for the purpose of restoring land following a flood or natural disaster.

(b) Prospecting for, or the extraction of, minerals for commercial purposes and the removal of overburden in total amounts of less than 1,000 cubic yards in any one location of one acre or less.

(c) Surface mining operations that are required by federal law in order to protect a mining claim, if such operations are conducted solely for that purpose.

(d) Such other surface mining operations which the board determines to be of an infrequent nature and which involve only minor surface disturbances.

2715. No provision of this chapter or any ruling, requirement, or policy of the board is a limitation on any of the following:

(a) On the police power of any city or county or on the power of any city or county to declare, prohibit, and abate nuisances

(b) On the power of the Attorney General, at the request of the board, or upon his own motion, to bring an action in the name of the people of the State of California to enjoin any pollution or nuisance.

(c) On the power of any state agency in the enforcement or administration of any provision of law which it is specifically authorized or required to enforce or administer.

(d) On the right of any person to maintain at any time any appropriate action for relief against any private nuisance as defined in Part 3 (commencing with Section 3479) of Division 4 of the Civil Code or for any other private relief.

(e) On the power of any city or county to adopt policies, standards, or regulations imposing additional requirements on any person if the requirements do not prevent the person from complying with the provisions of this chapter.

(f) On the power of any city or county to regulate the use of buildings, structures, and land as between industry, business, residents, open space (including agriculture, recreation, the enjoyment of scenic beauty, and the use of natural resources), and other purposes.

2716. Any person may commence an action on his own behalf against the board or the State Geologist for a writ of mandate pursuant to Chapter 2 (commencing with Section 1084) of Title 1 of Part 3 of the Code of Civil Procedure to compel the board or the State Geologist to carry out any duty imposed upon them pursuant to the provisions of this chapter.

2717. The board shall submit to the Legislature on December 1st of each year a report on the actions taken pursuant to this chapter during the preceding fiscal year. Such report shall include a statement of the actions, including legislative recommendations, which are necessary to carry out more completely the purposes and requirements of this chapter.

2718. If any provision of this chapter or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of the chapter which can be given effect without the invalid provision or application, and to this end the provisions of this chapter are severable.

Article 2. Definitions

2725. Unless the context otherwise requires, the definitions set forth in this article shall govern the construction of this chapter.

2726. "Area of regional significance" means an area designated by the board pursuant to Section 2790 which is known to contain a deposit of minerals, the extraction of which is judged to be of prime importance in meeting future needs for minerals in a particular region of the state within which the minerals are located and which, if prematurely developed for alternate incompatible land uses, could result in the permanent loss of minerals that are of more than local significance.

2727. "Area of statewide significance" means an area designated by the board pursuant to Section 2790 which is known to contain a deposit of minerals, the extraction of which is judged to be of prime importance in meeting future needs for minerals in the state and which, if prematurely developed for alternate incompatible land uses, could result in the permanent loss of minerals that are of more than local or regional significance.

2728. "Lead agency" means the city or county which has the principal responsibility for approving a surface mining operation pursuant to this chapter.

2729. "Mined lands" includes the surface, subsurface, and ground water of an area in which surface mining operations will be, are being, or have been conducted, including private ways and roads appurtenant to any such area, land excavations, workings, mining waste, and areas in which structures, facilities, equipment, machines, tools, or other materials or property which result from, or are used in, surface mining operations are located.

2730. "Mining waste" includes the residual of soil, rock, mineral, liquid, vegetation, equipment, machines, tools, or other materials or property directly resulting from, or displaced by, surface mining operations.

2731. "Operator" means any person who is engaged in surface mining operations, himself, or who contracts with others to conduct operations on his behalf, except a person who is engaged in surface mining operations as an employee with wages as his sole compensation.

2732. "Overburden" means soil, rock, or other materials that lie above a natural mineral deposit or in between mineral deposits, before or after their removal by surface mining operations.

2732.5. "Permit" means any authorization from, or approval by, a lead agency, the absence of which would preclude surface mining operations.

2733. "Reclamation" means the combined process of land treatment that minimizes water degradation, air pollution, damage to aquatic or wildlife habitat, flooding, erosion, and other adverse effects from surface mining operations, including adverse surface effects incidental to underground mines, so that mined lands are reclaimed to a usable condition which is readily adaptable for alternate land uses and create no danger to public health or safety. The process may extend to affected lands surrounding mined lands, and may require backfilling, grading, resoiling, revegetation, soil compaction, stabilization, or other measures.

2734. "State policy" means the state policy for the reclamation of mined lands adopted pursuant to Section 2755.

2735. "Surface mining operations" means all, or any part of, the process involved in the mining of minerals on mined lands by removing overburden and mining directly from the mineral deposits, open-pit mining of minerals naturally exposed, mining by the auger method, dredging and quarrying, or surface work incident to an underground mine. Surface mining operations shall include, but are not limited to:

- (a) Inplace distillation or retorting or leaching.
- (b) The production and disposal of mining waste.
- (c) Prospecting and exploratory activities.

Article 3. District Committees

2740. In carrying out the provisions of this chapter, the board may establish districts and appoint one or more district technical advisory committees to advise the board. In establishing districts for these committees, the board shall take into account physical characteristics, including, but not limited to, climate, topography, geology, type of overburden, and principal mineral commodities. Members of the committees shall be selected and appointed on the basis of their professional qualifications and training in mineral resource conservation, development and utilization, land use planning, mineral economics, or the reclamation of mined lands.

2741. The members of the committee shall receive no compensation for their services, but shall be entitled to their actual and necessary expenses incurred in the performance of their duties.

Article 4. State Policy for the Reclamation of Mined Lands

2755. On or before January 1, 1977, the board shall adopt state policy for the reclamation of mined lands in accordance with the general provisions set forth in Article 1 (commencing with Section 2710) of this chapter and pursuant to Chapter 4.5 (commencing with Section 11371) of Part 1 of Division 3 of Title 2 of the Government Code.

2756. State policy shall apply to the conduct of surface mining operations and shall include, but shall not be limited to, measures to be employed by local governments in specifying grading, backfilling, resoiling, revegetation, soil compaction, and other reclamation requirements, and for soil erosion control, water quality and watershed control, waste disposal, and flood control.

2757. The state policy adopted by the board shall be based upon a study of the factors that significantly affect the present and future condition of mined lands, and shall be used as standards by local governments in preparing specific and general plans, including the conservation and land use elements of the general plan, and zoning ordinances. The state policy shall not include aspects of regulating surface mining operations which are solely of local concern, and not of statewide or regional concern, as determined by the board, such as, but not limited to, hours of operation, noise, dust, fencing, and purely aesthetic considerations.

2758. Such policy shall include objectives and criteria for all of the following:

(a) Determining the lead agency pursuant to the provisions of Section 2771.

(b) The orderly evaluation of reclamation plans.

(c) Determining the circumstances, if any, under which the approval of a proposed surface mining operation by a lead agency need not be conditioned on a guarantee assuring reclamation of the mined lands.

2759. The state policy shall be continuously reviewed and may be revised. During the formulation or revision of such policy, the board shall consult with, and carefully evaluate the recommendations of, the State Geologist, any district technical advisory committees, concerned federal, state, and local agencies, educational institutions, civic and public interest organizations, and private organizations and individuals.

2760. The board shall not adopt or revise the state policy unless a public hearing is first held respecting their adoption or revision. At least 30 days prior to such hearing, the board shall give notice of the hearing by publication pursuant to Section 6061 of the Government Code.

2761. (a) On or before January 1, 1977, and, as a minimum, after the completion of each decennial census, the Office of Planning and Research shall identify urban and urbanizing portions of the following areas within the state subject to urban expansion or other irreversible land uses:

(1) Standard metropolitan statistical areas and such other areas for which information is readily available.

(2) Other areas as may be requested from time to time by the board.

(b) In accordance with a time schedule, and based upon guidelines adopted by the board, the State Geologist shall classify, on the basis solely of geologic factors, and without regard to existing land use and land ownership, the areas identified by the Office of Planning and Research, and such other areas as may be specified by the board, as one of the following:

(1) Areas containing little or no mineral deposits.

(2) Areas containing significant mineral deposits.

(3) Areas containing mineral deposits, the significance of which requires further evaluation.

(c) As it is completed by county, the State Geologist shall transmit such information to the board for incorporation into the state policy and for transmittal to lead agencies.

2762. (a) Within 12 months of receiving the mineral information described in Section 2761, and also within 12 months of the designation of an area of statewide or regional significance within its jurisdiction, every lead agency shall, in accordance with state policy, establish mineral resource management policies to be incorporated in its general plan which will:

(1) Recognize mineral information classified by the State Geologist and transmitted by the board.

(2) Assist in the management of land use which affect areas of statewide and regional significance.

(3) Emphasize the conservation and development of identified mineral deposits.

(b) Every lead agency shall submit proposed mineral resource management policies to the board for review and comment prior to adoption.

(c) Any subsequent amendment of the mineral resource management policy previously reviewed by the board shall also require review and comment by the board.

(d) Prior to permitting a use which would threaten the potential to extract minerals in an area classified by the State Geologist as an area described in paragraph (3) of subdivision (b) of Section 2761, the lead agency may cause to be prepared an evaluation of the area in order to ascertain the significance of the mineral deposit located therein. The results of such evaluation shall be transmitted to the State Geologist and the board.

Article 5. Reclamation Plans and the Conduct of Surface Mining Operations

2770. Except as specified in Section 2776, no person shall conduct surface mining operations unless a permit is obtained from, and a reclamation plan has been submitted to, and approved by, the lead agency for such operation pursuant to this article.

2771. Whenever a proposed surface mining operation is within the jurisdiction of two or more public agencies, is a permitted use within the agencies, and is not separated by a natural or manmade barrier coinciding with the boundary of the agencies, the evaluation of the proposed operation shall be made by the lead agency in accordance with the procedures adopted by the lead agency pursuant to Section 2774. In the event that a dispute arises as to which is the lead agency, any public agency which is a party to the dispute may submit the matter to the board; and the board shall designate the lead agency, giving due consideration to the capability of such agency to fulfill adequately the requirements of this chapter.

2772. The reclamation plan shall be filed with the lead agency on a form provided by the lead agency, by any person who owns, leases, or otherwise controls or operates on all, or any portion of any, mined lands, and who plans to conduct surface mining operations thereon.

The reclamation plan shall include the following information and documents:

(a) The name and address of the operator and the names and addresses of any persons designated by him as his agents for the service of process.

(b) The anticipated quantity and type of minerals for which the surface mining operation is to be conducted.

(c) The proposed dates for the initiation and termination of such operation.

(d) The maximum anticipated depth of the surface mining operation.

(e) The size and legal description of the lands that will be affected by such operation, a map that includes the boundaries and topographic details of such lands, a description of the general geology of the area, a detailed description of the geology of the area in which surface mining is to be conducted, the location of all streams, roads, railroads, and

utility facilities within, or adjacent to, such lands, the location of all proposed access roads to be constructed in conducting such operation, and the names and addresses of the owners of all surface and mineral interests of such lands.

(f) A description of and plan for the type of surface mining to be employed and a time schedule that will provide for the completion of surface mining on each segment of the mined lands so that reclamation can be initiated at the earliest possible time on those portions of the mined lands that will not be subject to further disturbance by the surface mining operation.

(g) A description of the proposed use or potential uses of the land after reclamation and evidence that all owners of a possessory interest in the land have been notified of the proposed use or potential uses.

(h) A description of the manner in which reclamation, adequate for the proposed use or potential uses will be accomplished, including: (1) a description of the manner in which contaminants will be controlled, and mining waste will be disposed; and (2) a description of the manner in which rehabilitation of affected streambed channels and streambanks to a condition minimizing erosion and sedimentation will occur.

(i) An assessment of the effect of implementation of the reclamation plan on future mining in the area.

(j) A statement that the person submitting the plan accepts responsibility for reclaiming the mined lands in accordance with the reclamation plan.

(k) Any other information which the lead agency may require by ordinance.

2773. The reclamation plan shall be applicable to a specific piece of property or properties, and shall be based upon the character of the surrounding area and such characteristics of the property as type of overburden, soil stability, topography, geology, climate, stream characteristics, and principal mineral commodities.

2774. Every lead agency shall adopt ordinances establishing procedures for the review and approval of reclamation plans and the issuance of a permit to conduct surface mining operations. Such procedures shall require at least one public hearing and periodic inspections of surface mining operations, and may include provisions for liens, surety bonds, or other security to guarantee reclamation in accordance with the reclamation plan. Such ordinances shall be continuously reviewed and revised, as necessary, in order to ensure that such ordinances are in accordance with state policy. Lead agencies shall notify the State Geologist of the filing of an application for a permit to conduct surface mining operations.

On request of a lead agency, the State Geologist shall furnish technical assistance to assist in the review of reclamation plans.

2775. (a) An applicant whose request for a permit to conduct surface mining operations in an area of statewide or regional significance has been denied by a lead agency, or any person who is aggrieved by the granting of a permit to conduct surface mining operations in an area of statewide or regional significance, may, within 15 days of exhausting his rights to appeal in accordance with the procedures of the lead agency, appeal to the board.

(b) The board may, by regulation, establish procedures for declining to hear appeals that it determines raise no substantial issues.

(c) Appeals that the board does not decline to hear shall be scheduled and heard at a public hearing held within the jurisdiction of the lead agency which processed the original application within 30 days of the filing of the appeal, or such longer period as may be mutually agreed upon by the board and the person filing the appeal. In any such action, the board shall not exercise its independent judgment on the evidence but shall only determine whether the decision of the lead agency is supported by substantial evidence in the light of the whole record. If the board determines the decision of

the lead agency is not supported by substantial evidence in the light of the whole record it shall remand the appeal to the lead agency and the lead agency shall schedule a public hearing to reconsider its action.

2776. No person who has obtained a vested right to conduct surface mining operations prior to January 1, 1976, shall be required to secure a permit pursuant to the provisions of this chapter as long as such vested right continues; provided, however, that no substantial changes may be made in any such operation except in accordance with the provisions of this chapter. A person shall be deemed to have such vested rights if, prior to January 1, 1976, he has, in good faith and in reliance upon a permit or other authorization, if such permit or other authorization was required, diligently commenced surface mining operations and incurred substantial liabilities for work and materials necessary therefor. Expenses incurred in obtaining the enactment of an ordinance in relation to a particular operation or the issuance of a permit shall not be deemed liabilities for work or materials.

A person who has obtained a vested right to conduct surface mining operations prior to January 1, 1976, shall submit to the lead agency and receive, within a reasonable period of time, approval of a reclamation plan for operations to be conducted after January 1, 1976, unless a reclamation plan was approved by the lead agency prior to January 1, 1976 and the person submitting the plan has accepted responsibility for reclaiming the mined lands in accordance with the reclamation plan.

Nothing in this chapter shall be construed as requiring the filing of a reclamation plan for, or the reclamation of, mined lands on which surface mining operations were conducted prior to January 1, 1976.

2777. Amendments to an approved reclamation plan may be submitted detailing proposed changes from the original plan. Substantial deviations from the original plan shall not be undertaken until such amendment has been filed with, and approved by, the lead agency.

2778. Reclamation plans, reports, applications, and other documents submitted pursuant to this chapter are public records, unless it can be demonstrated to the satisfaction of the lead agency that the release of such information, or part thereof, would reveal production, reserves, or rate of depletion entitled to protection as proprietary information. The lead agency shall identify such proprietary information as a separate part of the application. Proprietary information shall be made available only to the State Geologist and to persons authorized in writing by the operator and by the owner.

A copy of all reclamation plans, reports, applications, and other documents submitted pursuant to this chapter shall be furnished to the State Geologist by lead agencies on request.

2779. Whenever one operator succeeds to the interest of another in any incompleted surface mining operation by sale, assignment, transfer, conveyance, exchange, or other means, the successor shall be bound by the provisions of the approved reclamation plan and the provisions of this chapter.

Article 6. Areas of Statewide or Regional Significance

2790. After receipt of mineral information from the State Geologist pursuant to subdivision (c) of Section 2761, the board may by regulation adopted after a public hearing designate specific geographic areas of the state as areas of statewide or regional significance and specify the boundaries thereof. Such designation shall be included as a part of the state policy and shall indicate the reason for which the particular area designated is of significance to the state or region, the adverse effects that might result from premature development of incompatible land uses, the advantages that might be achieved from extraction of the minerals of the area, and the specific goals and policies to protect against the premature incompatible development of the area.

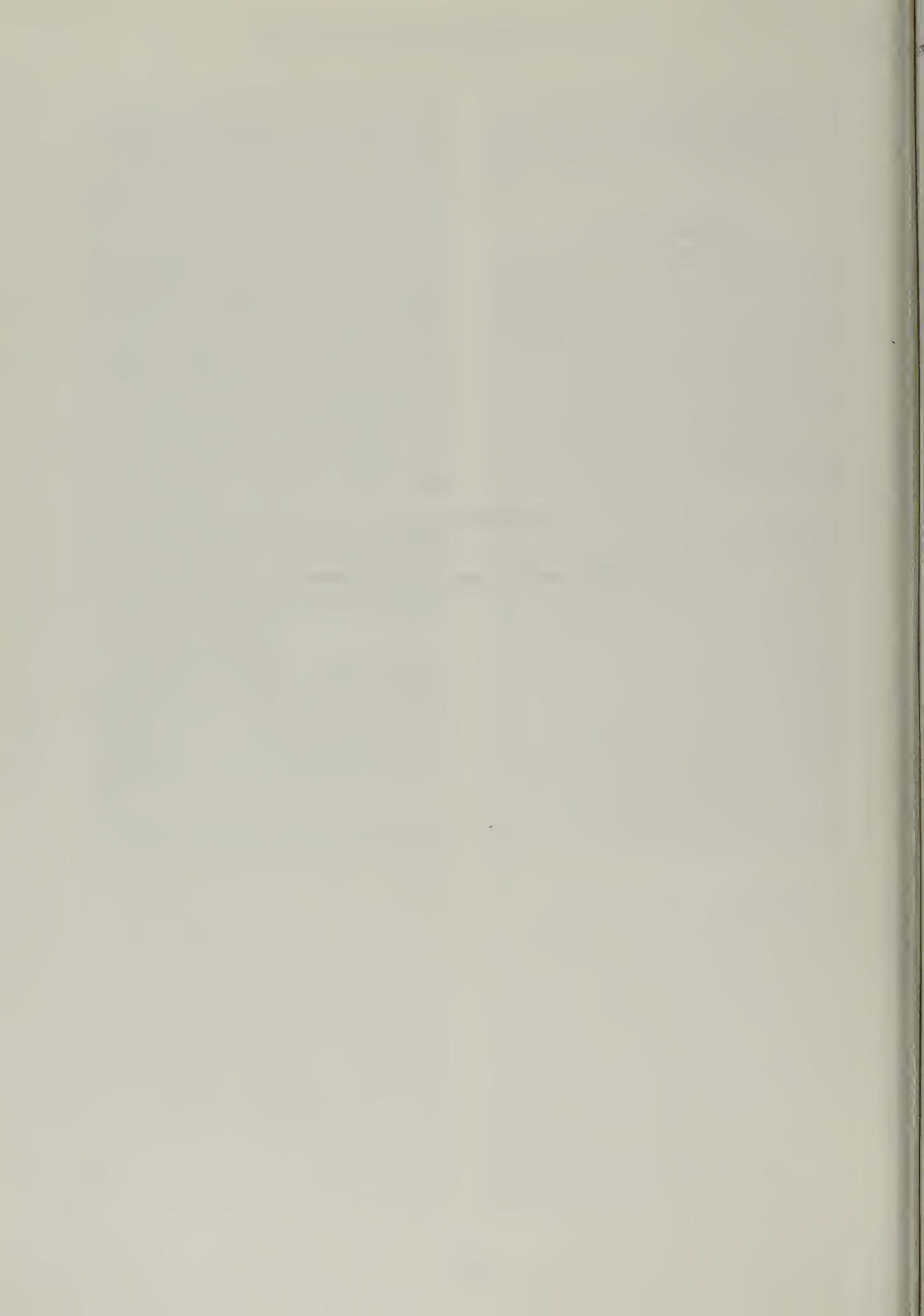
2791. The board shall seek the recommendations of concerned federal, state, and local agencies, educational institutions, civic and public interest organizations, and private organizations and individuals in the identification of areas of statewide and regional significance.

2792. Neither the designation of an area of regional or statewide significance nor the adoption of any regulations for such an area shall in any way limit or modify the rights of any person to complete any development that has been authorized pursuant to Part 2 (commencing with Section 11000) of Division 4 of the Business and Professions Code, pursuant to the Subdivision Map Act (Division 2 (commencing with Section 66410) of Title 7 of the Government Code), or by a building permit or other authorization to commence development, upon which such person relies and has changed his position to his substantial detriment, and, which permit or authorization was issued prior to the designation of such area pursuant to Section 2790. If a developer has by his actions taken in reliance upon prior regulations obtained vested or other legal rights that in law would have prevented a local public agency from changing such regulations in a way adverse to his interests, nothing in this chapter authorizes any governmental agency to abridge those rights.

2793. The board may, by regulation adopted after a public hearing, terminate, partially or wholly, the designation of any area of statewide or regional significance on a finding that the direct involvement of the board is no longer required.

APPENDIX A-2

State Mining and Geology Board *Resolution 22*



APPENDIX A-2

STATE MINING AND GEOLOGY BOARD

State of California

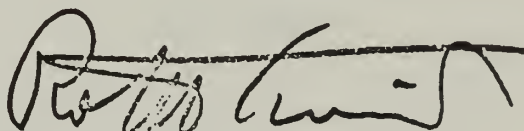
RESOLUTION NO. 22

WHEREAS the Board recognizes the importance of prioritizing classification projects so that potential mineral lands that are most likely to be converted to uses that are incompatible with mining are classified first (in conformance with Section 2761(b) of the Surface Mining and Reclamation Act of 1975 (SMARA) and the Guidelines for Classification and Designation of Mineral Lands adopted by the Board on June 30, 1978) and,

WHEREAS the Board recognizes the importance of periodically reviewing classification priorities to insure that the mineral resource conservation objectives of SMARA and the Board's guidelines are being met within existing funding and staffing constraints,

THEREFORE be it resolved that the prioritized list of mineral lands classification projects as adopted on January 13, 1978 be revised. The revised list as attached separates urban from non-urban and other areas for classification purposes. Priority is to be given to urban areas and their geographical subdivisions.

ADOPTED: November 2, 1978



Robert H. Twiss
Chairman

APPENDIX A-2

November 2, 1978

Priorities for Mineral Lands
ClassificationI. Urban Areas

Priority 1

- A. Greater Los Angeles Basin
- B. East San Francisco Bay Counties

Priority 2

- A. South, West and North San Francisco Bay Counties
- B. Sacramento - San Joaquin Valley Urbanizing Areas

Priority 3

- A. Western San Diego County
- B. Coastal Ventura and Santa Barbara County Areas
- C. Solano-Napa-Yolo Urbanizing Areas
- D. Bakersfield and Palmdale Areas
- E. San Luis Obispo - Santa Maria Area
- F. Fresno Area

II. Non-Urban And Other Areas Not Covered Above

Priority 1

California Desert Conservation Area (CDCA)

Priority 2

Forest Lands - RARE II Areas

Priority 3

Other Areas

APPENDIX A-3

State Mining and Geology Board *Guidelines for
Classification and Designation of Mineral Lands*



APPENDIX A-3



EDMUND G. BROWN, JR.
GOVERNOR OF CALIFORNIA

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION
STATE MINING AND GEOLOGY BOARD

1335 RESOURCES BUILDING
1416 - 9TH STREET, SACRAMENTO 95814
(916) 322-1082

1. Twiss
2. Anderson
3. Freitas
4. P. Fuller
5. Grantz
6. E. Krauss
7. Moore
8. Teng

July 13, 1978

SUBJECT: Guidelines for Classification and Designation of Mineral Lands

The Surface Mining and Reclamation Act of 1975 (SMARA) requires the State Mining and Geology Board to adopt state policies relative to mineral resource production and conservation.

Pursuant to this requirement the Board adopted the Guidelines for Classification and Designation of Mineral Lands following a June 30, 1978 public hearing held in Sacramento. A copy of these Guidelines is attached for your information.

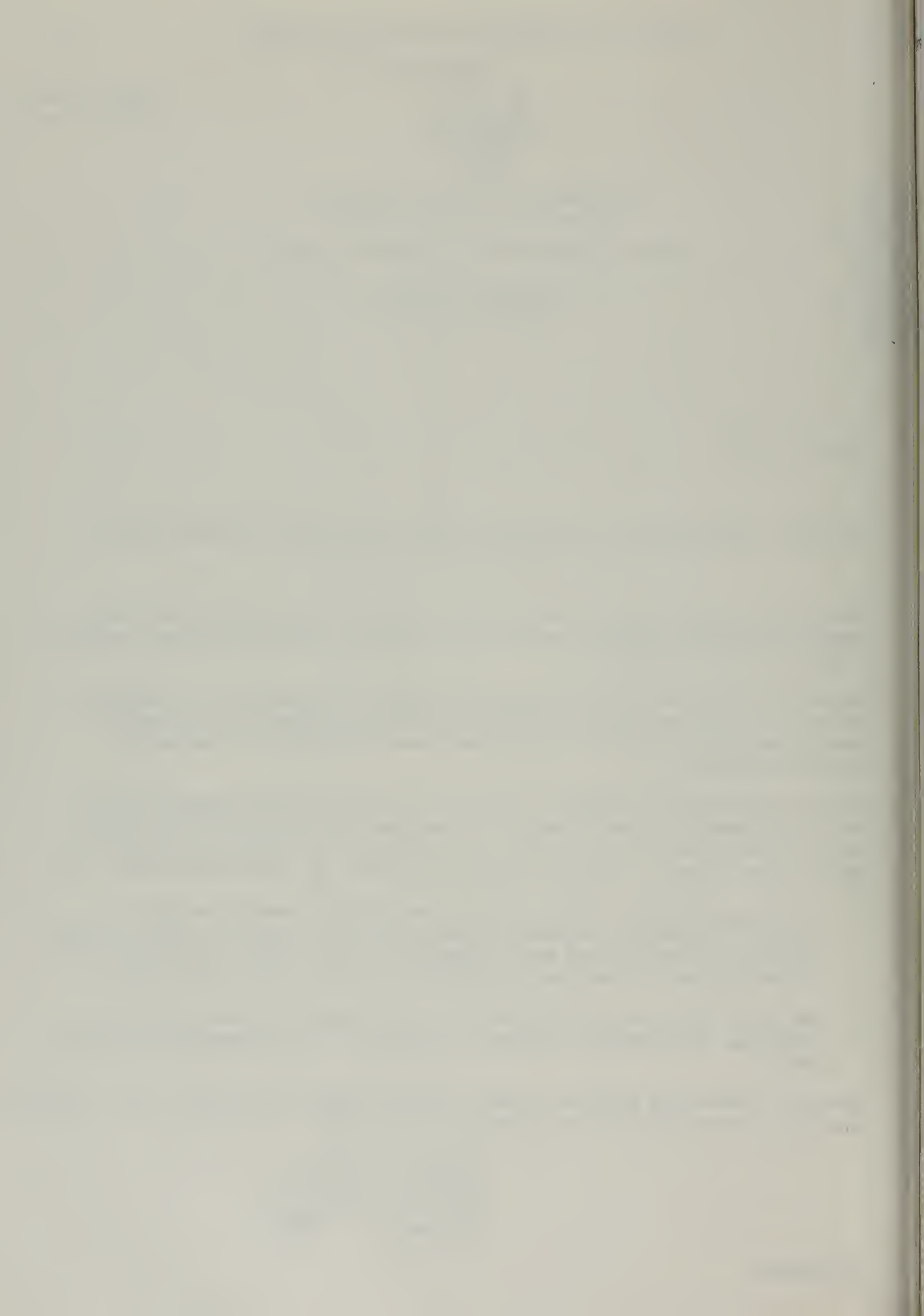
The Board has not yet adopted a policy on California Environmental Quality Act (CEQA) compliance as it relates to designation of mineral lands, page 17 of the Guidelines. In considering such a policy the Board will be guided by the Attorney General's Opinion SO 78/5 IL of June 19, 1978 which states that:

1. The designation by the State Mining and Geology Board of an area as being of regional or statewide significance is an activity which requires compliance with CEQA and an environmental impact report will be required if the designation may have a significant effect on the environment.
2. The State Mining and Geology Board is the appropriate lead agency for preparing environmental documents relating to the designation of mineral lands.

Questions concerning SMARA and Board policies should be directed to D.W. Sprague, Special Representative to the Board, (916) 322-1082.

Robert H. Twiss
Robert H. Twiss
Chairman

Attachment



GUIDELINES
FOR
CLASSIFICATION AND DESIGNATION
OF MINERAL LANDS

Prepared By

The State Mining and Geology Board
1416 Ninth Street, Room 1335
Sacramento, California 95814

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Return F. Moore
Ta-Liang Teng

PREFACE

The Surface Mining and Reclamation Act of 1975, enacted as Chapter 9, Division 2 of the Public Resources Code, requires the State Mining and Geology Board to adopt state policies relative to mineral resource production and conservation.

Pursuant to this requirement the Board adopted the Guidelines for Classification and Designation of Mineral Lands following a June 30, 1978 public hearing held in Sacramento, California.

CHAPTER 8. Mining and Geology

SUBCHAPTER 1. State Mining and Geology Board

Article II. GUIDELINES FOR CLASSIFICATION
AND DESIGNATION OF MINERAL LANDS

INTRODUCTION - The purpose of these guidelines is to implement the Surface Mining and Reclamation Act of 1975 by providing direction to the State Geologist in carrying out mineral resource classification of lands in California that are threatened by uses which would be incompatible with or would preclude mining. In addition, these guidelines establish procedures by which the State Mining and Geology Board may designate mineral-bearing areas of statewide or of regional significance.

Classification is the process of identification of lands containing significant mineral deposits. Designation is the formal recognition by the Board, after consultation with lead agencies and other interested parties, of areas containing mineral deposits of regional or statewide significance that should be protected from land uses incompatible with mineral extraction. The objective of the classification and designation processes is to insure, through appropriate lead agency policies and procedures, that mineral deposits of statewide or of regional significance are available when needed.

It is the Board's intention to review the guidelines from time to time and to revise them as necessary.

SECTION I. GUIDELINES FOR CLASSIFICATION
OF MINERAL LANDSClassification Criteria

- a) In accordance with these guidelines and a schedule adopted by the Board, the State Geologist shall classify areas of the State threatened by land uses incompatible with or that would preclude mining. Such areas will be

classified into Mineral Resource Zones (MRZ) and Scientific Resource Zones (SZ) as defined in this section and shall be based on geologic and economic factors without regard to existing land use and land ownership. The areas to be studied and their order of study shall be specified by the Board in consultation with the State Geologist.

- b) To be considered significant for the purpose of the classification of mineral lands a mineral deposit, or a group of deposits that can be mined as a unit, must meet the following criteria of marketability and threshold value. In these guidelines the term mineral deposits denotes natural occurrences of rock or mineral materials in or on the earth's crust that are known to be economically minable and such rock or mineral materials that are not minable at present but which may come into such demand as to become economically minable in the foreseeable future. The term mineral resources is used herein as a collective term for all mineral deposits of a particular kind, or for mineral deposits in general. The size of mineral deposits for the purpose of evaluating marketability and threshold value shall include the amounts of naturally occurring rock or mineral material of known or potential economic interest that can be measured, indicated or inferred by using available geologic and geophysical evidence in commonly accepted fashion. The terms measured, indicated and inferred are to be used as defined by the U.S. Bureau of Mines and the U.S. Geological Survey in U.S. Geological Survey Bulletin 1450-A.

- 1) Marketability - In determining marketability, mineral deposits shall be divided into two categories, those containing non-strategic and those containing strategic mineral commodities. Unique or rare occurrences of rocks, minerals or fossils that are of outstanding scientific significance are not required to meet marketability criteria.

1) Non-strategic mineral commodities are those which are available domestically and of which the United States imports less than 65% of its needs as reported annually by the U.S. Bureau of Mines. Deposits of mineral commodities in this category must be minable, processable and marketable under the technologic and economic conditions that exist at present or which can be estimated to exist in the foreseeable future. The amount of mineral resources needed for periods of the foreseeable future (50 years) shall be projected using past consumption figures, with appropriate adjustments based upon anticipated changes in market conditions and mining technology.

ii) Strategic mineral commodities are those that are in short domestic supply and important for national defense or the wellbeing of the domestic economy. For the purposes of these guidelines they are those mineral commodities of which the United States imports more than 65% of its needs, as reported annually by the U.S. Bureau of Mines, that are judged to be minable, processable and marketable in the foreseeable future if non-domestic sources of supply are cut off.

iii) Foreseeable future, as used in this paragraph and elsewhere in the guidelines is a time span of approximately 50 years. Because some of the conditions affecting extraction and marketability cannot be accurately projected 50 years into the future, conservative estimates shall be made in assessing whether a particular mineral resource can be mined, processed and marketed within the next 50 years.

2) Threshold value is the projected value (gross selling price) of the first marketable product from an individual mineral deposit or from a group

of deposits that can be operated as a unit, upon completion of extraction and any required mineral separation and processing. For those deposits which meet the marketability criteria, only those estimated to exceed the following threshold values in 1978-equivalent dollars shall be considered significant. These threshold values are intended to indicate in a general way the approximate minimum size of a mineral deposit that will be considered significant for classification and designation. They are not intended, nor could they in practice, be used as precise cut off values. For some deposits in some areas larger or smaller values than those specified would be required for a marketable deposit. If for technological or other reasons one or more parts of a mineral deposit cannot meet the marketability criteria those parts shall not be considered in estimating whether the deposit exceeds the threshold value.

- 1) Construction materials (minimum value \$5,000,000) - Mineral materials capable of being used in construction, such as sand and gravel or crushed rock, which normally receive minimal processing, commonly washing and grading, and for which the ratio of transportation costs to value of the processed material at the mine is high.
- 11) Industrial and chemical mineral materials (minimum value \$1,000,000) - Non-metallic mineral materials that normally receive extensive processing, such as heat or chemical treatment or fine sizing, and for which the ratio of transportation costs to value of the material at the mine is moderate or low. Examples of this category include:
 - Limestone, dolomite and marble except where used as construction aggregate
 - Specialty sands
 - Clays
 - Diatomite
 - Phosphate
 - Coal, lignite or peat mined primarily as a raw material for chemicals such as montan wax

Salines and evaporates such as borates and gypsum
 Feldspar
 Talc
 Building and dimension stone
 Asbestos
 Rock varieties producible into granules, rock flour, mineral wool, expanded shale, pozzolans and other similar commodities

- iii) Metallic and rare minerals (minimum value \$500,000) - Metallic elements and minerals, gemstones, and minerals that possess special properties valuable to science or industry. The ratio of transportation costs to the value of the material at the mine for this category is low. Examples include ores, deposits or crystals of:

Precious metals (gold, silver, platinum)
 Iron and other ferro alloy metals (iron, tungsten, chromium, manganese)
 Base metals (copper, lead, zinc)
 Mercury
 Uranium and thorium except syngenetic deposits in shale
 Rare earths
 Minor metals including rubidium and cesium
 Gemstones and semi-precious materials
 Niobium, tantalium
 Optical grade calcite

- iiii) Non-fluid mineral fuels (minimum value \$1,000,000) - Non-hydrothermal mineral fuels occurring in sedimentary rocks. Examples include:

Coal
 Lignite
 Peat
 Organic shale
 Tar sand
 Uranium and thorium (syngenetic deposits in shale)

- iiiii) Unique or rare occurrences of rocks, minerals or fossils that are of outstanding scientific significance (no threshold value).

Mineral Resource Zones (MRZ) and Scientific Resource Zone (SZ)

The following MRZ and SZ categories shall be used by the State Geologist in classifying the State's lands. The geologic and economic data and the arguments upon which each unit MRZ or SZ assignment is based shall be presented in the land classification information transmitted by the State Geologist to the Board.

- a) MRZ-1 Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence. This zone shall be applied where well developed lines of reasoning, based upon economic geologic principles and adequate data, demonstrate that the likelihood for occurrence of significant mineral deposits is nil or slight.
 - b) MRZ-2 Areas where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists. This zone shall be applied to known mineral deposits or where well developed lines of reasoning, based upon economic geologic principles and adequate data, demonstrate that the likelihood for occurrence of significant mineral deposits is high.
 - c) MRZ-3 Areas containing mineral deposits the significance of which cannot be evaluated from available data.
 - d) MRZ-4 Areas where available information is inadequate for assignment to any other MRZ zone.
 - e) SZ Areas containing unique or rare occurrences of rocks, minerals or fossils that are of outstanding scientific significance shall be classified in this zone.
3. Documentation and Transmittal of Mineral Lands Classification Data
- a) Areas assigned by the State Geologist to mineral resource zones shall be delineated on suitable maps of a scale adequate for use on lead agency general plan maps. These maps shall also show the boundaries of each permitting authority in the report area.
 - b) A map at a convenient scale and a summary report showing the mineral land classification for an entire county or, at the direction of the Board, major subdivisions of a county, or a major mineral district that includes

portions of two or more counties, shall be prepared after classification is complete. Each map and report shall be submitted to the Board which, after review and approval, shall transmit it to the appropriate lead agencies and make it available to other interested parties.

- c) Mineral land classification reports of regions containing Construction Materials classified MRZ-2 shall include the following additional information for each such mineral commodity:
- 1) The location and an estimate of the total quantity of each such construction material that is geologically available for mining in the report region. The limits of the region shall be considered to be the consumption areas for each potentially producible construction mineral commodity under consideration.
 - 2) An estimate of the total quantity of each such construction material that will be needed to supply the requirements of both the county and the marketing region in which it occurs for the next 50 years. The marketing region is defined as the area within which such material is usually mined and marketed. The amount of each construction material mineral resource needed for the next 50 years shall be projected using past consumption rates adjusted for anticipated changes in market conditions and mining technology. These estimates shall be periodically reviewed as provided in Section 1, Subsection 7.

Classification Priorities

Potential mineral lands that are most likely to be converted to uses that are incompatible with mining or which would preclude mining shall be classified first. Where the risk of conversion to incompatible land uses is equal, those areas with mineral deposits of greatest statewide or regional significance shall be classified first. The potential for loss may be through the process

of urbanization or through other irreversible uses of the mineral lands or of adjoining lands, with which mineral extraction would be incompatible.

5. Petitions for Mineral Lands Classification

a) Petitions may be brought before the Board by any individual or organization to classify mineral lands that are claimed to contain significant mineral deposits and which are claimed to be threatened by land uses incompatible with mining. Classification is a prerequisite to designation of regional or statewide significance. Once an area is classified as MRZ-2 or SZ, a petition may be submitted for designation consideration under Section II, Subsection 4. If a petitioner can supply sufficient geologic and economic data to support an MRZ-2 or SZ classification by the State Geologist, he may also petition the Board to consider designation. It is expected that such a joint petition will include detailed information, and supportive data on the amounts and value of mineral deposits claimed to be MRZ-2 or SZ and other information required under Section II, Subsection 4, Petitions for Designation. The threat to a mineral deposit may be due to incompatible uses of adjoining lands that would preclude mining, as well as to mineral lands themselves. Petitions submitted to the Board shall include the following information.

- 1) The petitioner's name, mailing address and interest (beneficial, jurisdictional, or other) in the area to be considered for classification
- 2) A map (USGS 7 1 2' quadrangle or other appropriate map) showing the boundaries of the area the petitioner wishes to be classified.
- 3) A description of the significant mineral deposits claimed to occur within the area described, including sufficient geologic and economic data to support the claim that the mineral deposits are significant as defined in these guidelines.

4) The imminency of the threatened change, if any, in the use of land containing the claimed significant mineral deposits to a use which would prevent their mining. The petitioner should be prepared to supply full documentation if requested.

5) The name and mailing address of each recorded land owner and each recorded lessee in and adjoining the area described.

b) The State Geologist shall make an evaluation of the data submitted in the petition as to its accuracy and sufficiency and determine if the area can be classified on the basis of both submitted and other readily available information. A recommendation shall be then submitted to the Board concerning:

1) The urgency of the requested classification.

2) The sufficiency of the submitted and other readily available data as a basis for classification, and the scope of any additional investigation required.

3) An estimation of the time required to classify the area.

c) Following the State Geologist's report, the Board shall determine the priority for classification of the land described in the petition in relation to other areas in the State's mineral lands classification program. Classification of the area will then proceed according to its assigned priority.

Lead Agency Responsibilities

a) Within 12 months of receiving the mineral lands classification map and report, every lead agency shall, in accordance with state policy, develop and adopt mineral resource management policies to be incorporated in its general plan which will:

1) Recognize the mineral classification information, including the classification maps, transmitted to it by the Board and include the classification maps in its general plan.

- 2) Emphasize the conservation and development of identified significant mineral deposits.
- b) Every lead agency shall submit its proposed mineral resource management policies to the Board for review and comment prior to adoption.
- c) Any subsequent amendment of the mineral resource management policies previously reviewed by the Board shall also require review and comment by the Board.
- d) Prior to permitting a use which would threaten the potential to extract minerals classified by the State Geologist as MRZ-3, the lead agency may cause to be prepared an evaluation of the area in order to ascertain the statewide or regional significance of the mineral deposits known or inferred to be located therein. The results of such an evaluation shall be transmitted to the State Geologist and to the Board for review and comment.

7. Periodic Review of Classified Lands

- a) After a period not to exceed 10 years following transmittal of mineral land classification information to lead agencies the State Geologist shall review the information to determine whether:
 - 1) A reclassification of the area is necessary.
 - 2) The projected requirements for Construction Materials (Subsection 3c of Section I of these guidelines) for 50 years should be revised.The State Geologist shall report the results of such reviews to the Board together with his recommendations.
- b) The Board may direct the State Geologist to reexamine mineral lands already classified on the basis of his recommendation, or for other reasons. Any resulting reclassification shall be treated in the same manner as the original classification, and employ the same marketability and threshold

criteria. The approximate span of time indicated above as being "the foreseeable future" for purposes of estimating marketability shall begin anew at time of reclassification.

SECTION II. PROCEDURES FOR DESIGNATION OF LANDS CONTAINING SIGNIFICANT MINERAL DEPOSITS

Designation Criteria

Areas to be considered for designation by the Board will contain one or more mineral deposits of statewide or regional significance. Ordinarily, classification of an area as MRZ-2 by the State Geologist will constitute adequate evidence that an area contains significant mineral deposits, but other data shall be considered by the Board in determining the significance of specific mineral deposits and the desirability of designation.

Designation Procedures

- a) Upon receipt from the State Geologist of a mineral lands classification map and report delineating one or more areas classified as MRZ-2 or SZ, the Board shall:
 - 1) Review the map and report to determine the sufficiency of the submitted data as a basis for designation, and request such additional information as may be required from the State Geologist or other sources.
 - 2) Determine the need for, and the priority of, designating the MRZ-2 and SZ areas, taking into consideration the importance of the mineral deposits to the State or region thereof and the imminency of any threatened land use changes that would be incompatible with mineral extraction.

- 3) Notify the appropriate lead agencies of the decision to consider designation of one or more mineral resource areas within their jurisdiction.
 - 4) Set a date and place for a public hearing to consider the areas which the Board proposes to designate as containing mineral deposits of statewide or regional significance. If practicable, the public hearing shall be held in or near the county in which the area proposed for designation occurs.
 - 5) Notify all affected agencies and parties having an interest in the lands considered for designation.
- b) At the public hearing to consider proposed designations, the Board shall seek the recommendations of concerned federal, state and local agencies, educational institutions, civic and public interest organizations, and private organizations and individuals in the identification of mineral deposits of statewide or of regional significance. Such review and comment should address:
- 1) The adequacy of the mineral land classification data transmitted by the State Geologist and of any additional data transmitted by the Board, which together will constitute the principal basis for designation.
 - 2) Additional data bearing on the presence and marketability of mineral deposits proposed to be of statewide or of regional significance in the area under consideration.
 - 3) The need, amount and location of mineral deposits of regional significance, namely Construction Materials as defined in Section 1, Subsection 1b of these guidelines, that should be designated to provide for the needs of the region for 50 years.

- 4) The need for the proposed designation of each mineral deposit of statewide significance, namely, Industrial and Chemical Mineral Materials, Metallic and Rare Minerals, Non-fluid Mineral Fuels, and Rocks, Minerals and Fossils of Outstanding Scientific Significance, as defined in Section 1, Subsection 1b of these guidelines. Ordinarily, such deposits are uncommon or rare, and economically significant occurrences warrant designation. However, some types, such as low grade limestone, low grade clays and other rock varieties that may be processed into valuable mineral products are often present in such large quantities that designation would be warranted only where special circumstances exist. Such circumstances might include proximity of a mineral deposit to markets, transportation, energy sources, or to other raw materials with which they could be combined to produce more valuable products.
 - 5) The existing uses of the areas proposed for designation and the future uses of these areas adopted by local agencies.
 - 6) Values relating to recreation, watershed, wildlife, range and forage, and aesthetic enjoyment.
- 7) Following the public hearing, the Board may designate to be of statewide or regional significance, and include in state policy, all or part of the areas classified as MRZ-2 or SZ. The designation shall specify the following:
- 1) The boundaries of the designated area.
 - 2) The mineral deposits of statewide or of regional significance contained in each designated area and an estimate of the amount of each mineral

commodity that is available for mining under present or foreseeable technologic, economic and land use conditions, for MRZ-2 areas, or a description of the materials of scientific value in the SZ area.

- 3) The reason that each designated area is of significance to the State or region, the advantages to the State or region, that might be achieved from the extraction of the minerals of the area, and the adverse effects that might result from premature development to land uses which would preclude mining.
- 4) The time limit, if any, for the designation.
- 5) The specific goals and policies to protect the areas containing mineral deposits designated to be of statewide or regional significance from premature development to uses which would preclude mining, or to uses with which mining would be incompatible.
- 6) Lead agencies having jurisdiction over the area.

3. Lead Agency Designation Responsibilities

- a) Upon designating an area containing significant mineral deposits the Board will transmit a report of its action to the affected lead agencies. The report will include a map of the designated areas at a scale suitable for general plan purposes.
- b) Every lead agency within 12 months of the designation of an area of statewide or regional significance within its jurisdiction, shall:
 - 1) Recognize and include in its general plan the designated areas of statewide and regional significance transmitted to it by the Board.
 - 2) Develop and adopt policies for the management of land use of areas classified MRZ-2 or SZ and designated by the Board as areas of statewide and regional significance to protect those areas from premature development incompatible with mining.

- 3) Emphasize the conservation and development of mineral deposits designated by the Board to be of statewide or regional significance.
- 4) Prior to the adoption of mineral resource management policies, lead agencies shall submit them to the Board for review and comment. The Board shall make its comment within 60 days of receipt of the proposed policies. Any subsequent amendment to these resource management policies shall also require Board review and comment.
- 5) The Board shall continuously monitor local government implementation of its mineral resource management policies for designated areas.

Petitions for Designation

- a) Prior to permitting a use which would threaten the potential to extract minerals classified by the State Geologist as MRZ-2 or SZ but not yet designated, the lead agency may petition the Board for a designation hearing.
- b) Petitions for a designation hearing may also be brought before the Board by any other party provided that the Board has received and approved land classification information that indicates that the area in question is classified MRZ-2 or SZ and that the Board has not yet considered designation. Petitions submitted to the Board shall include the following information.
 - 1) The petitioner's name, mailing address and interest (beneficial, jurisdictional, or other) in the area to be considered for designation.
 - 2) A map (USGS 7 1/2' quadrangle or other appropriate map) showing the boundaries of the MRZ-2 or SZ area the petitioner wishes to be designated.
 - 3) The reasons for requesting designation.
 - 4) The name and mailing address of each recorded land owner and each recorded lessee in and adjoining the area described.

The Board shall then evaluate the data submitted in the petition as to its accuracy and sufficiency. If the Board finds that the petition contains sufficient information and arguments to require a public hearing then the Board shall schedule such a hearing and proceed as outlined in this section.

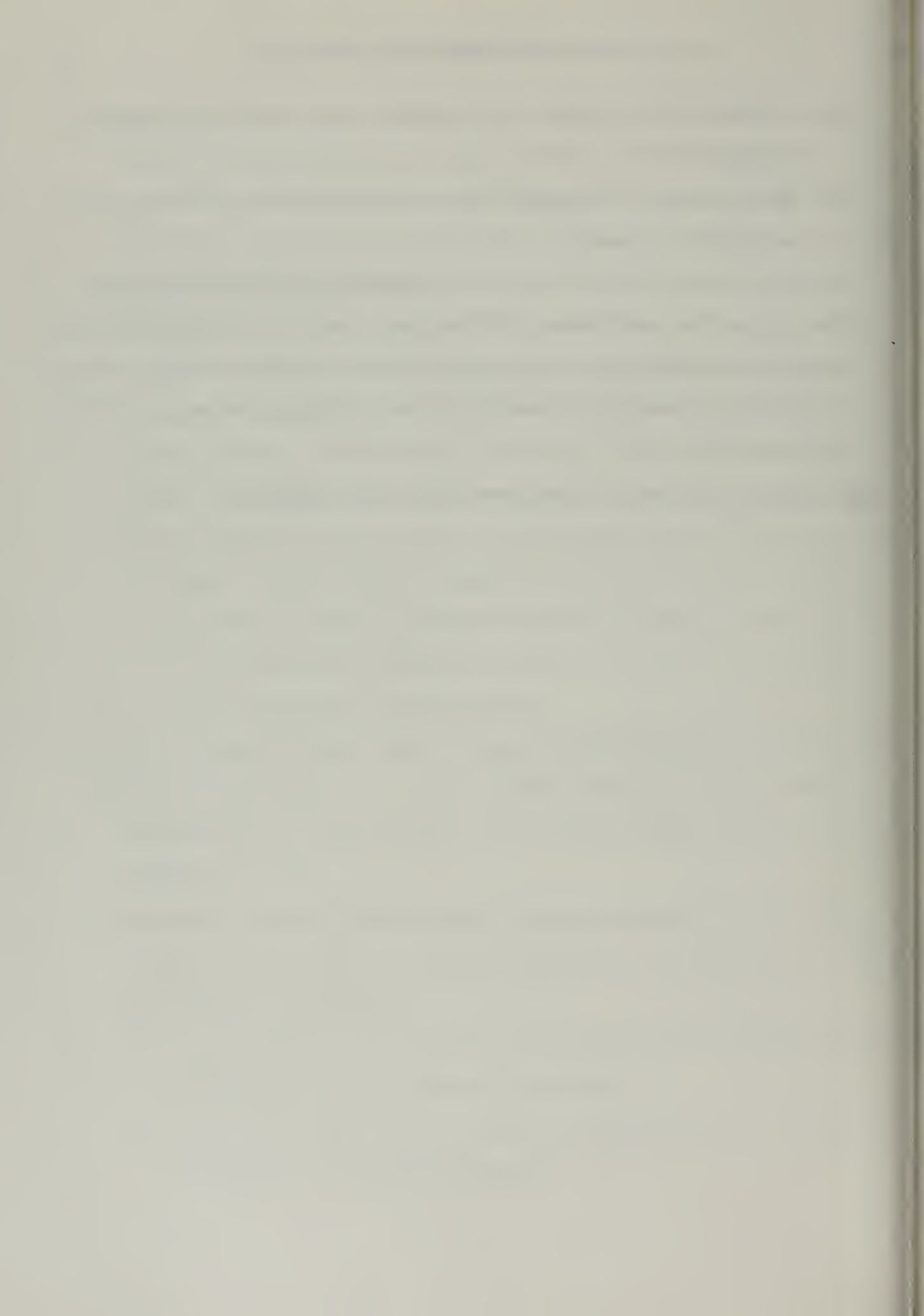
5. Termination of Designation Status

- a) The status of mineral lands previously designated to be of statewide or regional significance may be terminated, either partially or wholly, by the Board on a finding that the protection afforded by designation is no longer necessary. In making this finding the Board shall consult with affected lead agencies as to the desirability of terminating designation. Such a finding may result from, but not limited to the following reasons:
- 1) Depletion of the mineral deposit or deposits within the designated area.
 - 2) The mineral deposit or deposits within the designated area are shown to be in excess of quantities required for present or foreseeable future statewide or regional needs.
 - 3) Ending of the time limit, if any, for the designation to be in force.
- b) Prior to making such a finding, the Board shall hold a public hearing. If practicable it shall be held in or near the county in which the designated areas occur.
- c) Petitions may be brought before the Board to terminate the designated status of mineral lands. Petitions submitted to the Board shall include the following information:
- 1) The petitioner's name, mailing address and interest (beneficial, jurisdictional or other) in the petitioned area.
 - 2) A map (USGS 7 1/2' quadrangle or other appropriate map) and legal description of the petitioned area.

- 3) Reference shall be made to the specific Board action which designated the area.
- 4) The reasons and supporting data as to why direct Board involvement is no longer necessary.

The Board shall then evaluate the data submitted in the petition as to its accuracy and sufficiency. If the Board finds that the petition contains sufficient information and arguments to require a public hearing on termination, then the Board shall schedule such a hearing and proceed as outlined in this section.

CEQA Compliance (Reserved pending Attorney General's Opinion).



APPENDIX B

Sample copy of Los Angeles County Regional
Planning Commission Quarterly Bulletin,
Population and Housing Units





quarterly bulletin

DEPARTMENT OF REGIONAL PLANNING · COUNTY OF LOS ANGELES, CALIFORNIA

POPULATION IN SLIGHT INCREASE GENERAL TREND UNCHANGED

The number of Los Angeles County residents remained relatively unchanged during the second half of 1975. The Department estimates that on January 1, 1976 the County had a total population of 6,994,700. This represents a July through December gain of approximately 2,400 as compared with a loss of 28,500 in the first half. However, no particular significance should be given to these 1975 countywide gains and losses. Rather, the Department continues to believe that they represent minor fluctuations along what is essen-

(Continued on page 6)

SINGLE UNITS CLIMB SHARPLY—MULTIPLE UNITS HOLD FIRM IN SECOND HALF

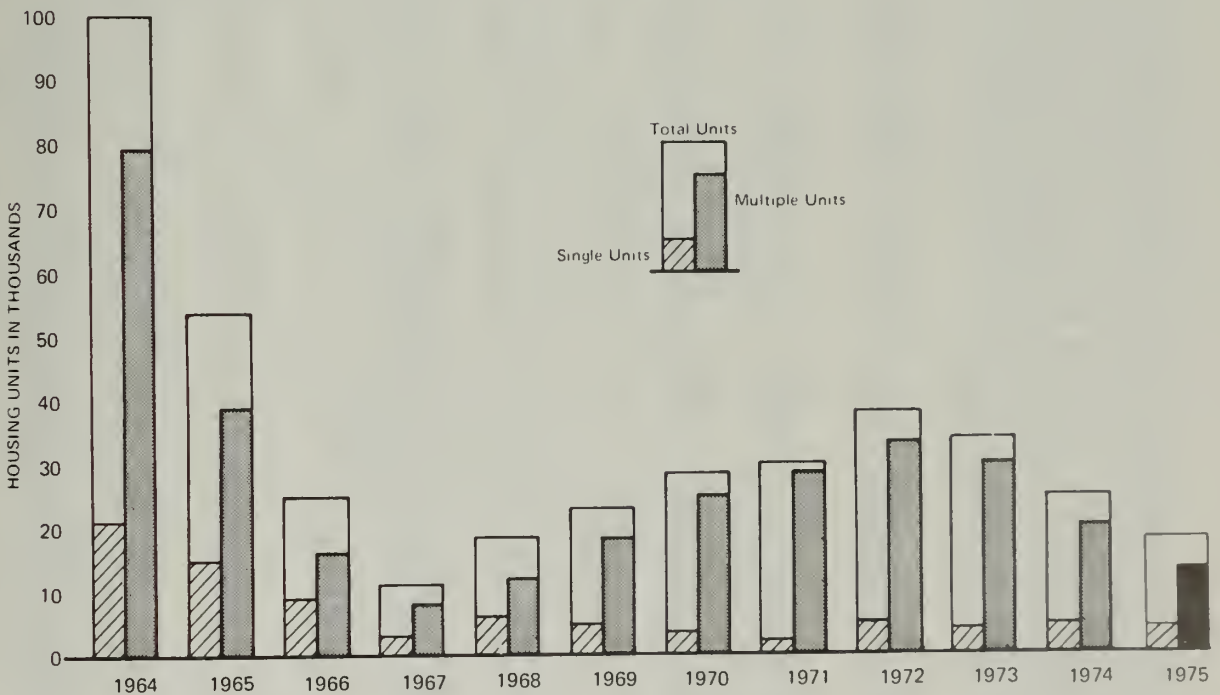
Net additions to single units climbed sharply and multiple units held firm in the second half of 1975. The 9,706 total units added in these six months fell slightly short of the 9,727 units recorded in the same period of 1974.

Single unit additions in the last six months totaled 2,924 or 1,733 units more than in the first half. This was the greatest number of single units added in any second half since 1968.

Multiple units added in last year's second half to-

(Continued on page 6)

LOS ANGELES COUNTY
ANNUAL NET HOUSING UNIT CHANGE
1964-1975



*Includes Duplex Units

For Additional Information: Call or write the Population Research Section, Los Angeles County Department of Regional Planning, 320 West Temple St., Los Angeles 90012, 974-6425.

THE REGIONAL PLANNING COMMISSION OF LOS ANGELES COUNTY. Commissioners: Howard D. Martin, Chairman, Owen H. Lewis, Vice Chairman, Arthur J. Baum, Sadie B. Clark and Carolyn P. Llewellyn. Planning Director: Norman Murdoch.

Quarterly Bulletin, No. 131, January 1, 1976

POPULATION AND HOUSING UNITS LOS ANGELES COUNTY STATISTICAL AREAS

MSA and SA No.	Name or Jurisdiction	1970 CENSUS Revised		JANUARY 1, 1976 Estimated		MSA and SA No.	Name or Jurisdiction	1970 CENSUS Revised		JANUARY 1, 1976 Estimated	
		Population	Housing Units	Housing Units	Population			Population	Housing Units	Housing Units	Population
LOS ANGELES COUNTY						9.0	CENTRAL AREA	90,416	48,466	48,179	82,016
TOTAL ALL CITIES						9.11	Part of Los Angeles	75,555	40,591	40,464	69,385
TOTAL UNINCORPORATED						9.12	Part of Los Angeles	14,861	7,875	7,715	12,631
TOTAL FOR CITIES IN TWO OR MORE STATISTICAL AREAS						10.0	DOMINGUEZ-LOS ANGELES HARBOR AREA	228,608	67,466	72,969	229,494
	Carson	71,150	18,430	22,101	78,661	10.111	Part of Los Angeles	39,915	12,698	12,911	38,986
	Compton	78,547	21,929	21,673	72,538	10.112	Part of Los Angeles	24,714	7,942	8,860	24,794
	Industry	712	156	149	680	10.12	Part of Los Angeles	70,249	21,768	23,412	69,602
	Lakewood	83,025	24,263	25,418	79,492	10.211	Unincorporated	15,918	4,475	5,806	17,698
	Los Angeles	2,811,801	1,074,173	1,131,406	2,746,135	10.212	Unincorporated	2,827	674	356	1,525
	Rosemead	40,972	13,430	13,597	39,842	10.213	Unincorporated	5,980	1,948	—	—
	Santa Fe Springs	14,750	3,764	4,323	15,826	10.22	Unincorporated	1,711	584	622	1,627
	Temple City	31,034	10,998	11,240	29,110	10.31	Part of Carson	39,948	10,530	11,070	37,917
	Torrance	134,968	45,528	49,322	133,953	10.32	Part of Carson	27,192	6,811	7,932	31,692
	West Covina	68,034	19,154	22,931	73,277	10.4	Part of Compton	154	36	36	148
	Whittier	72,863	25,817	27,173	70,961	10.5	Part of Carson	(5,980)	(1,948)	1,964	5,505
1.0	ADAMS AREA	469,892	181,648	185,956	451,147	11.0	EAST AREA	203,387	58,946	58,712	192,280
1.11	Part of Los Angeles	48,376	21,259	22,746	47,715	11.11	Part of Los Angeles	83,040	23,459	23,369	78,347
1.12	Part of Los Angeles	53,080	20,783	20,762	50,915	11.12	Part of Los Angeles	26,605	9,535	9,065	23,070
1.13	Part of Los Angeles	97,372	38,495	38,628	91,059	11.21	Unincorporated	43,492	10,840	11,146	41,707
1.14	Part of Los Angeles	69,156	28,602	28,597	66,706	11.22	Unincorporated	50,250	15,112	15,132	49,156
1.151	Part of Los Angeles	57,096	21,199	20,812	52,798	12.0	EL MONTE AREA	107,641	35,177	34,727	102,610
1.152	Part of Los Angeles	91,558	31,895	31,469	85,591	12.1	El Monte	69,892	23,701	23,689	67,048
1.2	Culver City	34,451	13,075	16,465	37,666	12.21	Unincorporated	5,244	1,490	1,441	4,979
1.311	Unincorporated	6,535	2,064	2,187	6,851	12.22	Unincorporated	4,911	1,370	403	1,443
1.312	Unincorporated	12,268	4,276	4,290	11,846	12.3	South El Monte	13,443	3,725	4,313	15,574
2.0	AVALON AREA	1,906	1,174	1,267	1,968	12.4	Part of Rosemead	14,151	4,891	4,875	13,566
2.1	Avalon	1,520	1,080	1,173	1,591	12.5	Part of Whittier	(0)	(0)	0	0
2.2	Unincorporated	386	94	94	377	13.0	ENCINO-CENTRAL VALLEY AREA	364,147	130,638	148,409	377,254
3.0	BEVERLY HILLS AREA	92,800	40,517	43,979	92,800	13.11	Part of Los Angeles	55,442	19,159	21,485	56,877
3.1	Beverly Hills	33,416	15,092	15,412	31,825	13.12	Part of Los Angeles	34,446	10,664	12,321	37,979
3.21	Part of Los Angeles	9,869	3,766	4,013	9,849	13.13	Part of Los Angeles	78,918	25,260	27,814	78,045
3.22	Part of Los Angeles	49,466	21,641	24,536	51,077	13.14	Part of Los Angeles	136,532	55,892	61,894	138,409
3.3	Unincorporated	49	18	18	49	13.15	Part of Los Angeles	58,989	19,663	24,895	65,944
4.0	BURBANK AREA	264,922	106,276	110,966	256,271	14.0	GLENDALE AREA	241,928	99,047	102,562	235,433
4.1	Burbank	88,871	35,963	36,689	83,275	14.1	Glendale	132,664	56,455	59,418	131,234
4.21	Part of Los Angeles	46,825	14,402	15,124	45,876	14.21	Part of Los Angeles	53,725	19,849	19,790	51,120
4.22	Part of Los Angeles	83,944	35,877	37,555	82,230	14.22	Part of Los Angeles	35,919	15,942	16,428	33,895
4.23	Part of Los Angeles	45,275	20,031	21,595	44,883	14.3	Unincorporated	19,620	6,801	6,926	19,184
4.3	Unincorporated	7	3	3	7	15.0	HOLLYWOOD AREA	199,715	111,930	118,502	190,137
5.0	CALABASAS AREA	18,935	5,838	10,488	30,546	15.1	Part of Los Angeles	165,093	90,644	94,913	155,038
5.111	Unincorporated	6,417	2,013	3,520	10,563	15.2	Unincorporated	34,622	21,286	23,589	35,099
5.112	Unincorporated	4,710	1,345	3,422	10,007	16.0	INGLEWOOD AREA	348,414	127,435	132,363	326,108
5.12	Unincorporated	6,279	2,106	3,141	8,396	16.1	Gardena	41,021	14,678	17,511	43,124
5.2	Hidden Hills	1,529	374	405	1,580	16.2	Inglewood	89,985	38,346	38,769	81,641
6.0	CHATSWORTH-WEST VALLEY AREA	175,788	51,762	60,310	190,004	16.3	Hawthorne	53,304	19,692	23,243	55,358
6.11	Part of Los Angeles	43,668	12,937	16,679	51,012	16.4	Part of Torrance	34,601	10,848	11,521	33,507
6.12	Part of Los Angeles	84,982	25,125	28,899	89,135	16.5	Part of Los Angeles	18,378	5,783	5,803	17,801
6.13	Part of Los Angeles	45,712	13,170	14,206	48,491	16.611	Unincorporated	42,707	14,484	12,221	33,218
6.2	Unincorporated	915	283	285	871	16.612	Unincorporated	5,195	1,737	1,475	3,980
6.3	Unincorporated	511	247	241	495	16.631	Unincorporated	16,121	6,246	6,166	15,147
7.0	CITRUS AREA	264,029	76,824	82,784	264,639	16.632	Unincorporated	11,997	3,905	3,478	9,552
7.1	Azusa	25,217	8,175	9,263	25,194	16.633	Unincorporated	9,846	3,546	3,494	8,774
7.2	Covina	30,395	9,803	11,242	33,104	16.64	Unincorporated	434	232	214	387
7.3	Part of West Covina	63,830	18,114	19,889	63,075	16.7	Lawndale	24,825	7,938	8,468	23,619
7.4	Glendora	31,380	9,403	10,712	34,097	17.0	LONG BEACH AREA	435,413	173,852	182,329	410,492
7.511	Unincorporated	13,920	3,517	3,799	14,045	17.1	Signal Hill	5,588	2,403	2,410	4,996
7.512	Unincorporated	13,125	3,563	3,449	12,299	17.2	Long Beach	358,879	150,133	159,123	342,054
7.521	Unincorporated	23,709	6,265	6,280	22,289	17.31	Unincorporated	2,477	716	0	0
7.522	Unincorporated	14,384	4,095	3,934	12,808	17.32	Unincorporated	2,153	613	609	2,107
7.6	Baldwin Park	47,285	13,681	14,012	47,002	17.33	Unincorporated	143	46	31	89
7.7	Irwindale	784	208	204	726	17.4	Part of Lakewood	66,173	19,941	20,156	61,246
8.0	COMPTON AREA	177,215	53,139	52,514	160,111	18.0	MONROVIA AREA	141,061	49,571	51,527	136,929
8.1	Part of Compton	78,393	21,893	21,637	72,390	18.1	Arcadia	45,138	16,442	17,457	45,487
8.2	Lynwood	43,354	15,794	15,099	36,500	18.2	Monrovia	30,562	11,615	11,727	29,071
8.31	Unincorporated	1,055	357	357	989	18.3	Sierra Madre	12,140	4,444	4,563	12,137
8.32	Unincorporated	9,850	3,259	3,211	9,652	18.41	Unincorporated	11,694	3,459	3,530	10,738
8.331	Unincorporated	24,835	9,346	9,545	31,264	18.42	Unincorporated	1,834	628	647	1,849
8.332	Unincorporated	5,718	1,401	1,530	5,769	18.5	Bradbury	838	242	258	861
8.4	Part of Carson	4,010	1,098	1,135	3,547	18.6	Duarte	14,981	4,545	4,942	14,645
						18.7	Part of Temple City	23,874	8,196	8,403	22,141

Quarterly Bulletin, No. 131, January 1, 1976

MSA and SA No.	Name or Jurisdiction	1970 CENSUS Revised		JANUARY 1, 1976 Estimated		MSA and SA No.	Name or Jurisdiction	1970 CENSUS Revised		JANUARY 1, 1976 Estimated	
		Population	Housing Units	Housing Units	Population			Population	Housing Units	Housing Units	Population
19.0	MALIBU AREA	11,709	4,535	6,213	15,609	28.0	SAN GABRIEL AREA	235,010	87,102	89,494	227,316
19.11	Unincorporated	5,637	2,049	3,227	8,355	28.1	Alhambra	62,125	25,963	26,552	58,561
19.12	Unincorporated	6,072	2,486	2,986	7,254	28.2	Monterey Park	49,166	16,337	16,918	49,563
20.0	NORTH COUNTY AREA	132,966	43,268	54,601	155,758	28.3	San Gabriel	29,336	10,774	11,106	28,084
20.111	Unincorporated	1,519	675	830	1,776	28.4	San Marino	14,177	4,630	4,640	13,459
20.112	Unincorporated	7,976	3,064	3,536	8,610	28.5	South Pasadena	22,979	9,897	10,333	23,046
20.113	Unincorporated	38,582	12,322	16,228	44,010	28.64	Unincorporated	17,203	6,592	6,762	15,484
20.114	Unincorporated	3,369	1,455	1,569	3,237	28.65	Unincorporated	6,043	1,568	1,624	5,874
20.121	Unincorporated	13,870	4,282	4,691	13,921	28.7	Part of Rosemead	26,821	8,539	8,722	26,276
20.122	Unincorporated	4,443	2,036	2,179	4,326	28.8	Part of Temple City	7,160	2,802	2,837	6,969
20.123	Unincorporated	2,686	869	914	2,685	29.0	SAN VICENTE-PALISADES AREA	44,126	14,744	15,751	43,704
20.124	Unincorporated	1,919	607	1,048	3,540	29.11	Part of Los Angeles	7,803	2,713	2,965	7,777
20.131	Unincorporated	3,966	685	1,580	6,126	29.12	Part of Los Angeles	13,268	4,019	4,155	13,118
20.132	Unincorporated	28,759	8,283	10,251	34,288	29.13	Part of Los Angeles	23,055	8,012	8,631	22,809
20.133	Unincorporated	15,353	5,151	6,953	21,109	30.0	SANTA MONICA-VENICE AREA	260,254	113,605	128,541	266,391
20.14	Unincorporated	2,013	1,023	968	1,776	30.1	Santa Monica	88,289	42,106	46,308	88,609
20.2	Palmdale	8,511	2,816	3,854	18,354	30.21	Part of Los Angeles	41,872	21,602	23,574	41,814
21.0	NORTHEAST AREA	170,698	62,555	63,526	166,222	30.22	Part of Los Angeles	58,814	23,214	25,864	59,774
21.11	Part of Los Angeles	59,927	24,830	25,579	59,323	30.231	Part of Los Angeles	27,467	8,864	9,737	27,449
21.12	Part of Los Angeles	34,771	11,053	11,130	33,618	30.232	Part of Los Angeles	36,146	15,466	17,004	37,078
21.13	Part of Los Angeles	39,329	15,891	16,001	37,655	30.32	Unincorporated	3,693	2,311	6,012	10,165
21.14	Part of Los Angeles	36,671	10,781	10,816	35,626	30.4	Unincorporated (Sawtells Home)	3,973	42	42	1,502
22.0	NORWALK AREA	322,677	101,687	116,348	341,742	31.0	SOUTH BAY AREA	182,904	68,174	75,004	182,175
22.1	Unincorporated	355	83	83	352	31.1	El Segundo	15,620	5,994	6,155	14,880
22.2	Corritos	15,856	4,623	12,639	41,897	31.2	Hermosa Beach	17,412	7,942	9,264	18,325
22.3	Downey	88,573	31,494	33,571	88,180	31.3	Manhattan Beach	35,352	13,127	13,473	32,399
22.4	Paramount	34,734	11,588	11,391	30,684	31.4	Rondo Beach	57,451	20,251	24,900	63,304
22.6	Norwalk	90,164	23,785	24,976	86,815	31.51	Part of Los Angeles	49,903	17,684	17,990	46,384
22.7	Bellflower	52,334	19,293	21,009	50,204	31.52	Part of Los Angeles	4,260	1,784	1,755	3,846
22.8	Artesia	14,757	4,018	4,501	15,511	31.61	Unincorporated	1,169	753	816	1,076
22.10	Hawaiian Gardens	9,052	2,481	2,916	9,853	31.62	Unincorporated	1,737	639	651	1,561
22.11	Part of Lakewood	16,852	4,322	5,262	18,246	32.0	SOUTHEAST AREA	447,654	161,766	160,982	418,692
23.0	PALOS VERDES AREA	184,898	59,719	68,028	197,771	32.1	Bell	21,836	9,052	9,246	21,751
23.1	Palos Verdes Estates	13,631	3,973	4,434	14,518	32.2	Maywood	16,996	6,873	6,815	16,466
23.2	Part of Torrance	100,367	34,680	37,801	100,446	32.3	Huntington Park	33,744	15,725	15,340	32,327
23.311	Unincorporated	29,433	7,770	873	2,229	32.4	Montebello	42,807	14,449	16,755	46,502
23.312	Unincorporated	12,898	3,448	2,610	9,804	32.5	South Gate	56,909	23,541	23,892	52,707
23.4	Rolling Hills	2,050	568	611	2,125	32.6	Vernon	261	109	105	263
23.5	Rolling Hills Estates	6,735	1,766	2,335	8,447	32.71	Part of Los Angeles	75,888	28,192	27,233	67,210
23.6	Lomita	19,784	7,514	7,866	19,382	32.721	Part of Los Angeles	29,383	8,130	7,509	24,088
23.7	Rancho Palos Verdes (Incorp. 9/7/73)			11,498	40,820	32.722	Part of Los Angeles	49,665	16,098	14,851	41,724
24.0	PASADENA AREA	185,454	70,989	73,335	179,603	32.81	Unincorporated	262	108	106	255
24.1	Pasadena	112,951	46,923	49,180	107,940	32.82	Unincorporated	11,139	4,003	4,024	10,423
24.21	Unincorporated	20,714	6,141	6,279	20,918	32.831	Unincorporated	24,606	7,932	7,762	24,504
24.22	Unincorporated	2,027	889	878	1,874	32.832	Unincorporated	18,294	5,708	5,570	16,529
24.231	Unincorporated	42,415	14,331	14,315	41,816	32.833	Unincorporated	8,925	3,704	3,693	8,737
24.232	Unincorporated	1,409	420	427	1,318	32.84	Unincorporated	0	0	—	—
24.233	Unincorporated	5,938	2,285	2,256	5,737	32.9	Commerce	10,435	3,131	3,075	10,197
25.0	POMONA AREA	149,654	46,616	51,951	155,147	32.10	Cudahy	16,998	5,459	5,461	16,818
25.1	Pomona	87,384	28,864	29,809	83,784	32.11	Bell Gardens	29,308	9,552	9,545	28,191
25.2	Claremont	23,998	6,788	7,475	25,200	33.0	TUJUNGA AREA	53,630	17,270	17,368	51,528
25.3	La Verne	12,965	4,135	6,001	17,545	33.1	Part of Los Angeles	53,630	17,270	17,368	51,528
25.41	Unincorporated	1,064	278	280	1,015	34.0	WHITTIER AREA	269,173	78,470	83,275	267,884
25.42	Unincorporated	6,476	1,892	2,120	7,578	34.1	Part of Whittier	72,863	25,817	27,173	70,961
25.43	Unincorporated	2,075	284	303	2,068	34.21	Unincorporated	2,283	553	706	2,775
25.5	San Olmas	15,692	4,375	5,963	17,957	34.22	Unincorporated	20,845	6,154	6,218	19,545
26.0	PUEENTE HILLS AREA	177,014	43,172	55,802	213,649	34.23	Unincorporated	4,695	1,388	1,515	4,837
26.11	Unincorporated	21,452	4,713	4,769	21,004	34.241	Unincorporated	43,008	11,766	12,475	43,497
26.121	Unincorporated	11,793	3,192	3,413	12,036	34.242	Unincorporated	12,339	3,333	3,102	11,293
26.122	Unincorporated	37,794	9,270	9,429	46,429	34.25	Unincorporated	13,384	3,228	1,762	7,182
26.131	Unincorporated	17,189	4,066	4,110	16,849	34.31	Part of Santa Fe Springs	6,939	1,728	2,193	8,247
26.132	Unincorporated	12,386	2,703	3,012	13,160	34.32	Part of Santa Fe Springs	7,811	2,036	2,130	7,579
26.141	Unincorporated	21,125	5,469	8,830	33,042	34.4	Pico Rivera	54,170	14,647	15,222	51,390
26.142	Unincorporated	13,303	3,330	5,642	21,207	34.5	La Mirada	30,808	7,811	10,770	40,550
26.3	La Puente	31,092	7,652	8,173	30,460	34.6	Part of Industry	28	9	9	28
26.4	Part of Industry	684	147	140	652	35.0	WILSHIRE AREA	172,424	89,431	94,987	161,682
26.5	Walnut	5,992	1,590	2,404	8,608	35.11	Part of Los Angeles	37,150	19,442	20,266	33,378
26.6	Part of West Covina	4,204	1,040	3,042	10,202	35.12	Part of Los Angeles	37,566	22,387	25,969	37,630
27.0	SAN FERNANDO AREA	215,516	58,794	63,023	219,612	35.13	Part of Los Angeles	51,207	26,657	27,627	49,107
27.1	San Fernando	16,571	5,559	5,524	15,240	35.14	Part of Los Angeles	46,501	20,943	21,123	41,567
27.21	Part of Los Angeles	40,349	11,182	11,836	41,349	35.2	Unincorporated	0	2	2	0
27.22	Part of Los Angeles	60,275	16,195	19,104	67,118						
27.23	Part of Los Angeles	32,671	8,714	9,015	31,032						
27.24	Part of Los Angeles	65,650	17,144	17,544	64,873						

LOS ANGELES COUNTY HOUSING TRENDS* NET CHANGES COMPARED JULY THROUGH DECEMBER

	Housing Units		Change	
	1975	1974	From Year Ago Number	Percent
Single Units**	2,924	1,951	.973	49.9
Multiple Units	6,782	7,776	-994	-12.8
Total Units	9,706	9,727	-21	-0.2

*These figures are compiled from a survey of residential new construction, move-ins, removals, demolitions and alterations reported by each of the permit issuing agencies in Los Angeles County. Housing unit changes are entered in the housing inventory either upon completion or after an assumed completion date.

**Includes single units, duplex units and mobile homes.

HOUSING (Continued from page 1)

taled 6,782. This was a slight gain of 123 units over the number added in the previous six months, but 994 units or 12.8 percent below those added in the same period of the previous year.

Single units accounted for 30 percent of the net units added in the second half as compared with 15 percent in the first six months. While this resurgence of single family home construction may foreshadow the beginning of a trend, the major finding which emerges from a review of the 1975 housing records is that 77 percent of the net units added were in multiple structures. The overwhelming character and longevity of this dominance is clearly shown in the bar graph on page 1. The April 1976 issue will contain a more complete review of the housing changes in 1975.

POPULATION (Continued from page 1)

tially a horizontal trend line centered upon a total population of 7,000,000.

Generally, population changes within the County continued to follow the long established pattern of gains in the outlying suburban areas and losses or little change in the central urban districts. For example, twelve of the thirteen Major Statistical Areas and twenty-two of the thirty cities which registered population increases in 1975 are located in the suburbs. Population changes in the unincorporated areas also reflected this pattern, increasing approximately 10,300 to a January 1, 1976 total of 1,021,500. At the same time, those living in cities declined approximately 36,300 to a total of 5,973,200.

A review of the 1975 population changes within a fifteen mile radius of downtown Los Angeles shows that this central urban area lost approximately 38,000 inhabitants. However, not all cities and unincorporated places within this radius experienced losses. In fact, in the southeastern quadrant of this radius, a counter trend may be emerging.

A notable example is the Compton Area (MSA 8.0), an area which has been in continuous decline since the 1970 Census, losing an estimated 17,800 residents in this period. However, in 1975, the decline was halted and the Compton Area experienced a small net gain.

Some other older urban areas have also experienced a steady decline in housing vacancies which suggests that similar turnarounds have or are about to occur. However, there is not yet sufficient corroborative evidence to determine whether these declining vacancies foreshadow a reversal of past trends or merely reflect short-term local conditions.

CENSUS TRACTS UNDER REVIEW PART OF 1980 CENSUS PREPARATIONS

A review of Los Angeles County census tracts has begun in preparation for their use in the 1980 Census. No major changes are contemplated in the overall tract design. However, some of the existing 1,576 census tracts now have populations in excess of 8,000 and physical changes have occurred which require a re-examination of the boundaries of several others.

A preliminary survey indicates that, in updating the Los Angeles County Census Tract Plan for the 1980 Census, thirty to forty census tracts may be divided and perhaps as many minor boundary adjustments made. Although some changes will be necessary, every effort will be made to preserve the integrity of the existing boundaries so that comparability of the 1980 census tract data with that of earlier censuses will not be impaired.

The original numbering plan of one to three digits with an alphabetical suffix was replaced in 1960 by a four digit system, which in turn was expanded to six digits in 1970. No basic change in the existing numbering system for the 1980 Census is anticipated.

POPULATION AND HOUSING TABLE NOTES

Housing unit adjustments contained in this issue include the following:

Statistical Area No.	Jurisdiction	Housing Units			*
		Single	Mobile Homes	Multiple	
14.1	Glendale	5			(2)
		-96			(1)
18.1	Arcadia	12			(2)
18.42		-12			(3)
20.2	Palmdale	1	39	4	(2)
20.121	Unincorporated	-1	-39	-4	(3)
24.21	Unincorporated	-5			(3)
25.2	Claremont	11			(2)
25.42	Unincorporated	-11			(3)

*Reason adjusted: (1) Demolitions in redevelopment area; (2) Annexation; (3) Annexed to adjacent city.

Adjustments were made in the population estimates of the following cities in order to recognize the results of recent special censuses: Pasadena (SA 24.1), Claremont (SA 25.2) Carson (SA's 8.4, 10.213, 10.31 and 10.32), and Pico Rivera (SA 34.4). The housing counts for these cities will be adjusted in the July 1976 issue.

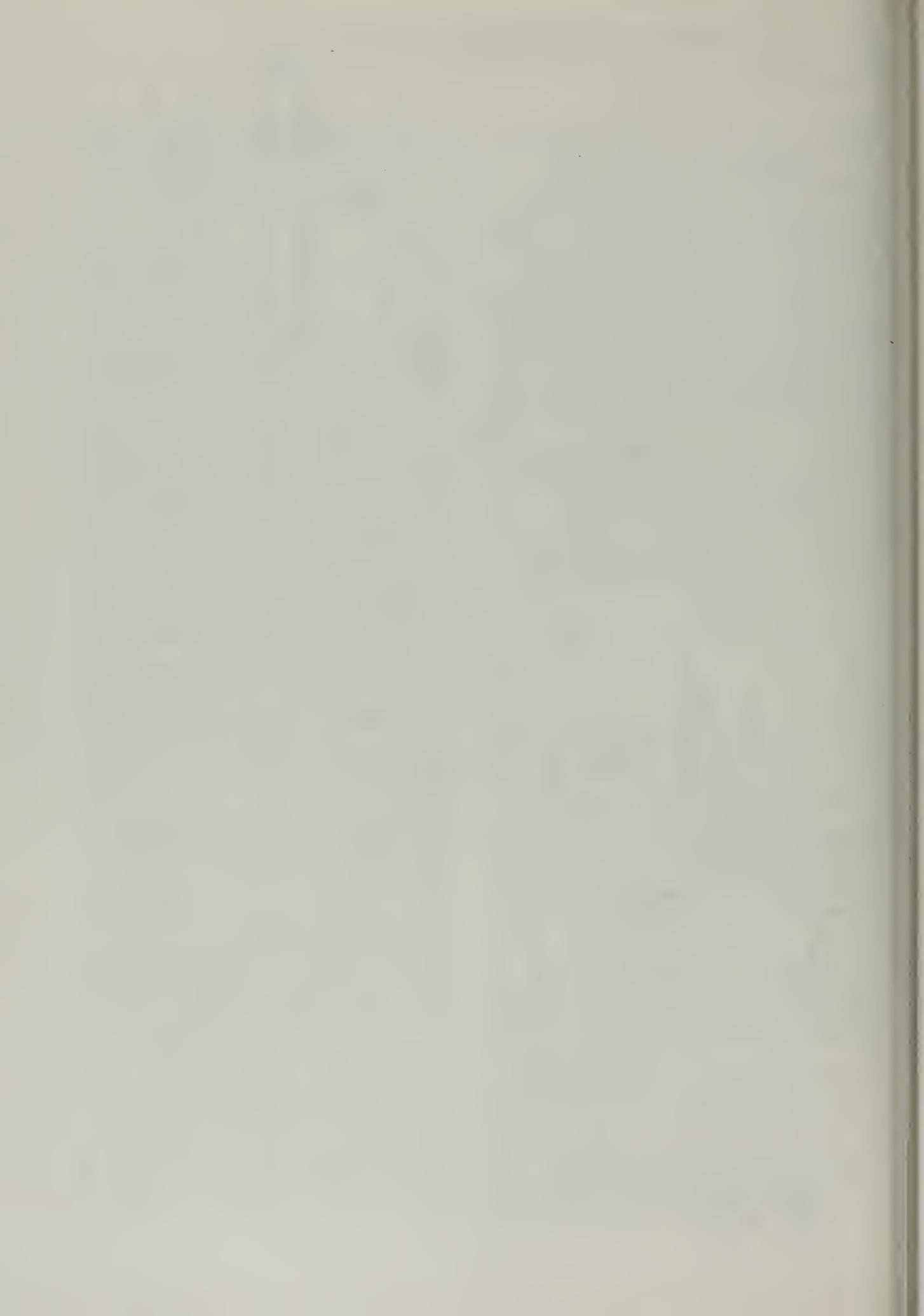
EDITOR'S NOTE

During the past seventeen years, Laura Mowrey has worked in or been in charge of the unit responsible for updating the housing inventory. In this capacity, she has initiated or supervised the implementation of many changes which have improved the quality and widened the scope of this file.

The housing estimates in this and the April issues are the last to be compiled under her supervision. Now retired, she has left us a valuable legacy in the procedures, techniques, and qualitative standards she established.

Two other changes also should be noted. Both Richard Kawasaki, Assistant Section Head, and Pamela Holt have been transferred to other departmental functions, while Bill Dunlap, Patricia Emmons and Marcelle Mehlinger have joined Faye Howard on the staff.





APPENDIX C

Principles of the Mineral Resources Classification
System of the U.S. Bureau of Mines and the U.S.
Geological Survey (From U.S. Geological Survey Bulletin 1450A)



Principles of the Mineral Resource Classification System of the U.S. Bureau of Mines and U.S. Geological Survey

MINERAL RESOURCE CLASSIFICATION SYSTEMS OF THE
U.S. BUREAU OF MINES AND U.S. GEOLOGICAL SURVEY

GEOLOGICAL SURVEY BULLETIN 1450-A

*A report published jointly by the
U.S. Bureau of Mines and
U.S. Geological Survey*

*Definitions of mineral resource classification
terms used by the U.S. Bureau of Mines and
U.S. Geological Survey*



UNITED STATES DEPARTMENT OF THE INTERIOR

THOMAS S. KLEPPE, *Secretary*

GEOLOGICAL SURVEY

V. E. McKelvey, *Director*

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MINERAL RESOURCE CLASSIFICATION SYSTEMS OF THE
U.S. BUREAU OF MINES AND U.S. GEOLOGICAL SURVEY

PRINCIPLES OF THE MINERAL RESOURCE CLASSIFICATION SYSTEM OF THE U.S. BUREAU OF MINES AND U.S. GEOLOGICAL SURVEY

GENERAL DEFINITION OF MINERAL AND ENERGY RESOURCES

The dictionary definition of resource "something in reserve or ready if needed" has been extended for mineral and energy resources to comprise all materials surmised to exist having present or future values. In geologic terms a mineral or energy resource is a concentration of naturally occurring solid, liquid, or gaseous materials in or on the Earth's crust in such form that economic extraction of a commodity is currently or potentially feasible. Material classified as a reserve is that portion of an identified resource producible at a profit at the time of classification.

Total Resources are materials that have present or future value and comprise identified or known materials plus those not yet identified, but which on the basis of geologic evidence are presumed to exist.

PHILOSOPHIC BASIS FOR A RESOURCE CLASSIFICATION

Public attention usually is focused on current economic availability of mineral or energy materials (reserves). Long-term public and commercial planning, however, must be based on the probability of geologic identification of resources in as yet undiscovered deposits and of technologic development of economic extraction processes for presently unworkable deposits. Thus, all the components of Total Resources must be continuously reassessed in the light of new geologic knowledge, of progress in science, and of shifts in economic and political conditions.

Another requirement of long-term planning is the weighing of total or multi-commodity resource availability against a particular need. To achieve this the general classification system must be uniformly applicable to all commodities so that data for alternate or substitute commodities can be compared.

A2 MINERAL RESOURCE CLASSIFICATION SYSTEMS

To serve these planning purposes Total Resources are classified both in terms of economic feasibility and of the degree of geologic assurance. The factors involved are incorporated in figure 1 to provide a graphic classification of Total Resources.

General guides for the use of this classification system are as follows:

1. Resource categories and definitions in the classification, as specified in the glossary, should be applicable to all naturally occurring concentrations of metals, nonmetals, and fossil fuels. The categories may be subdivided for special purposes.
2. Definitions may be amplified, where necessary, to make them more precise and conformable with accepted usage for particular commodities or types of resource evaluations.
3. Quantities and qualities may be expressed in a variety of terms and units to suit different purposes, but must be clearly stated and defined.

GLOSSARY OF RESOURCE TERMS

Resource.—A concentration of naturally occurring solid, liquid, or gaseous materials in or on the Earth's crust in such form

PRINCIPLES OF THE CLASSIFICATION SYSTEM A3

that economic extraction of a commodity is currently or potentially feasible.

Identified resources.—Specific bodies of mineral-bearing material whose location, quality, and quantity are known from geologic evidence supported by engineering measurements with respect to the demonstrated category.

Undiscovered resources.—Unspecified bodies of mineral-bearing material surmised to exist on the basis of broad geologic knowledge and theory.

Reserve.—That portion of the identified resource from which a usable mineral and energy commodity can be economically and legally extracted at the time of determination. The term *ore* is used for reserves of some minerals.

The following definitions for measured, indicated, and inferred are applicable to both the Reserve and Identified-Subeconomic resource components.¹

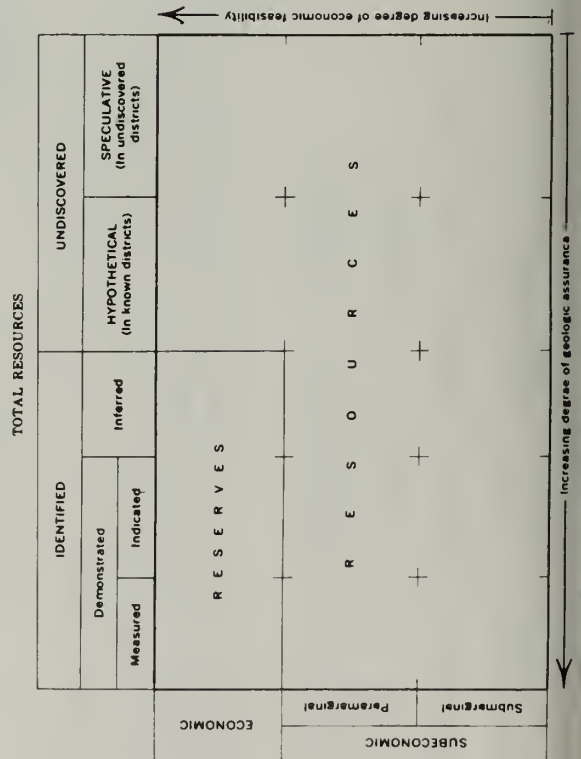
Measured.—Reserves or resources for which tonnage is computed from dimensions revealed in outcrops, trenches, workings, and drill holes and for which the grade is computed from the results of detailed sampling. The sites for inspection, sampling, and measurement are spaced so closely and the geologic character is so well defined that size, shape, and mineral content are well established. The computed tonnage and grade are judged to be accurate within limits which are stated, and no such limit is judged to be different from the computed tonnage or grade by more than 20 percent.

Indicated.—Reserves or resources for which tonnage and grade are computed partly from specific measurements, samples, or production data and partly from projection for a reasonable distance on geologic evidence. The sites available for inspection, measurement, and sampling are too widely or otherwise inappropriately spaced to permit the mineral bodies to be outlined completely or the grade established throughout.

Demonstrated.—A collective term for the sum of measured and indicated reserves or resources.

Inferred.—Reserves or resources for which quantitative estimates are based largely on broad knowledge of the geologic charac-

¹ The terms proved, probable, and possible (used by the industry and economic evaluations of ore in specific deposits or districts) commonly have been used loosely and interchangeably with the terms measured, indicated, or inferred (used by the Department of the Interior mainly for regional or national estimates). The terms "proved", "measured", "inferred", "indicated", "probable", and "possible" however, are not synonymous. The terms "measured" and "inferred" are not synonymous. The terms "proved", "probable", and "possible" however, are not synonymous. The terms "measured" and "inferred" are not synonymous. The terms "proved", "probable", and "possible" however, are not synonymous. The terms "measured" and "inferred" are not synonymous. The terms "proved", "probable", and "possible" however, are not synonymous.



A4 MINERAL RESOURCE CLASSIFICATION SYSTEMS

ter of the deposit and for which there are few, if any, samples or measurements. The estimates are based on an assumed continuity or repetition, of which there is geologic evidence; this evidence may include comparison with deposits of similar type. Bodies that are completely concealed may be included if there is specific geologic evidence of their presence. Estimates of inferred reserves or resources should include a statement of the specific limits within which the inferred material may lie.

Identified-Subeconomic.—Resources that are not Reserves, but may become so as a result of changes in economic and legal conditions.

Paramarginal.—The portion of Subeconomic Resources that (1) borders on being economically producible or (2) is not commercially available solely because of legal or political circumstances.

Submarginal.—The portion of Subeconomic Resources which would require a substantially higher price (more than 1.5 times the price at the time of determination) or a major cost-reducing advance in technology.

Hypothetical resources.—Undiscovered resources that may reasonably be expected to exist in a known mining district under known geologic conditions. Exploration that confirms their existence and reveals quantity and quality will permit their reclassification as a Reserve or Identified-Subeconomic resource.

Speculative resources.—Undiscovered resources that may occur either in known types of deposits in a favorable geologic setting where no discoveries have been made, or in as yet unknown types of deposits that remain to be recognized. Exploration that confirms their existence and reveals quantity and quality will permit their reclassification as Reserves or Identified-Subeconomic resources.

AREAS OF RESPONSIBILITY AND OPERATIONAL PROCEDURES

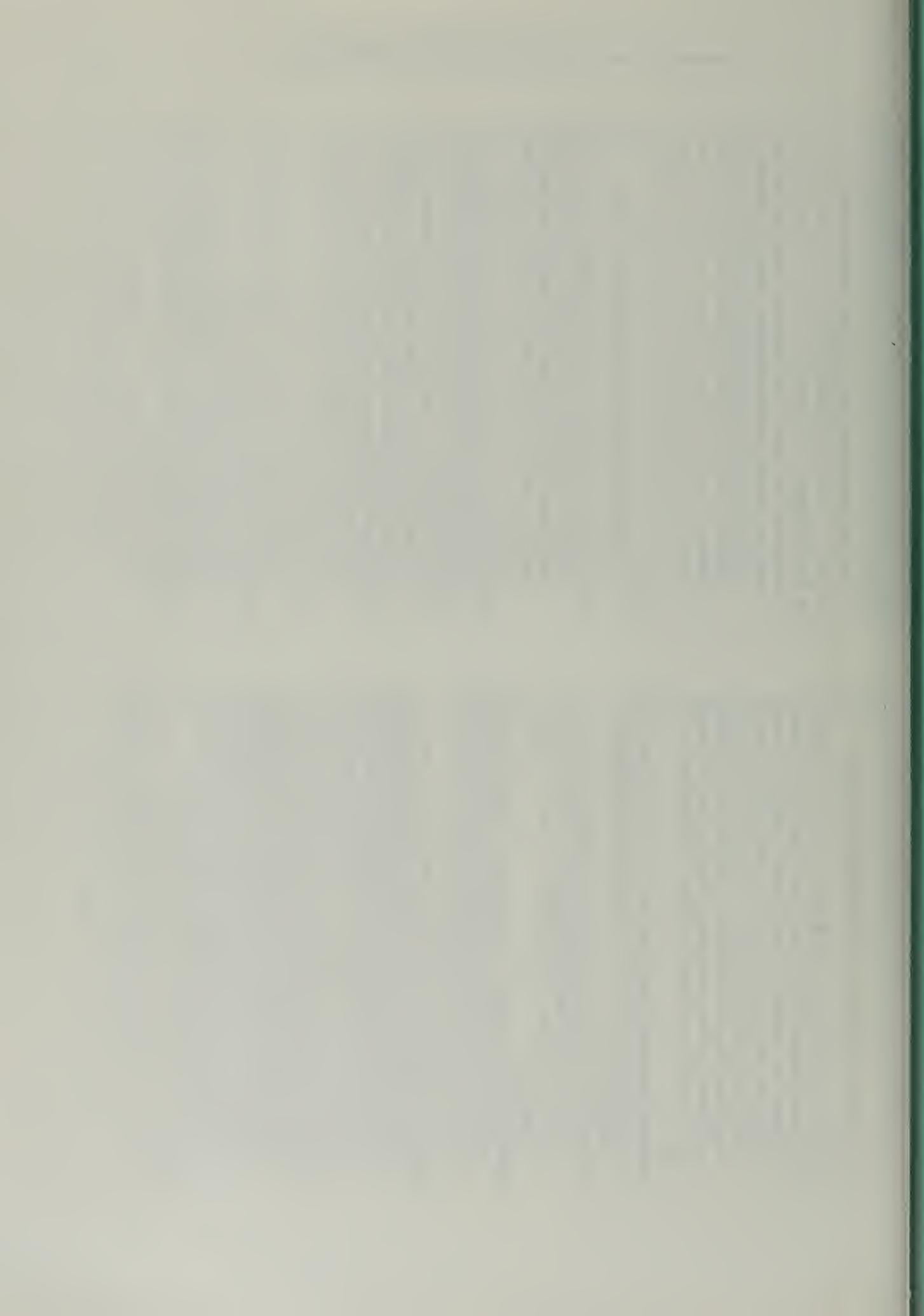
U.S. Bureau of Mines.—The Bureau appraises, analyzes, and publishes reserve estimates from base data supplied by the mineral and energy materials industry, the U.S. Geological Survey, and other governmental agencies. The Bureau judges commodity recoverability on existing economic and legal factors.

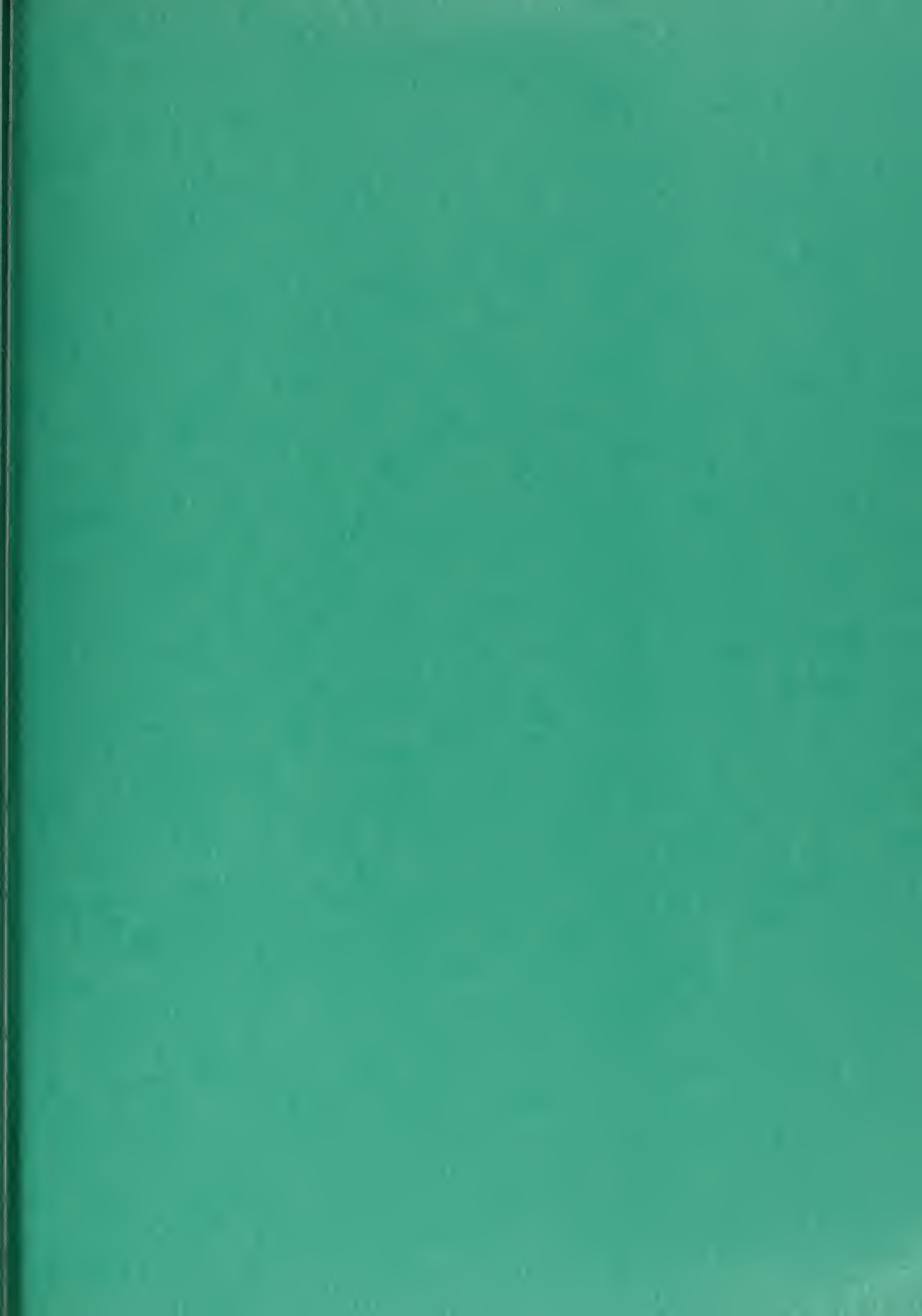
PRINCIPLES OF THE CLASSIFICATION SYSTEM A5

U.S. Geological Survey.—The Survey appraises, analyzes, and publishes estimates of Total Resources. It reports such measurable parameters of significance to resource evaluation as location, quality, quantity, and situation of Identified resources.

Annual Resource Summation.—The U.S. Bureau of Mines and U.S. Geological Survey will confer and agree annually on estimates in all of the resource categories defined above. These data will be in Bureau or Survey publications and will be available for inclusion in the Secretary's Annual Report required by the Mining and Minerals Policy Act of 1970.

Ad Hoc Joint Conferences.—The Directors will convene ad hoc joint work groups to resolve problems in the resource area.





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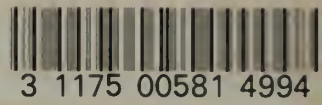
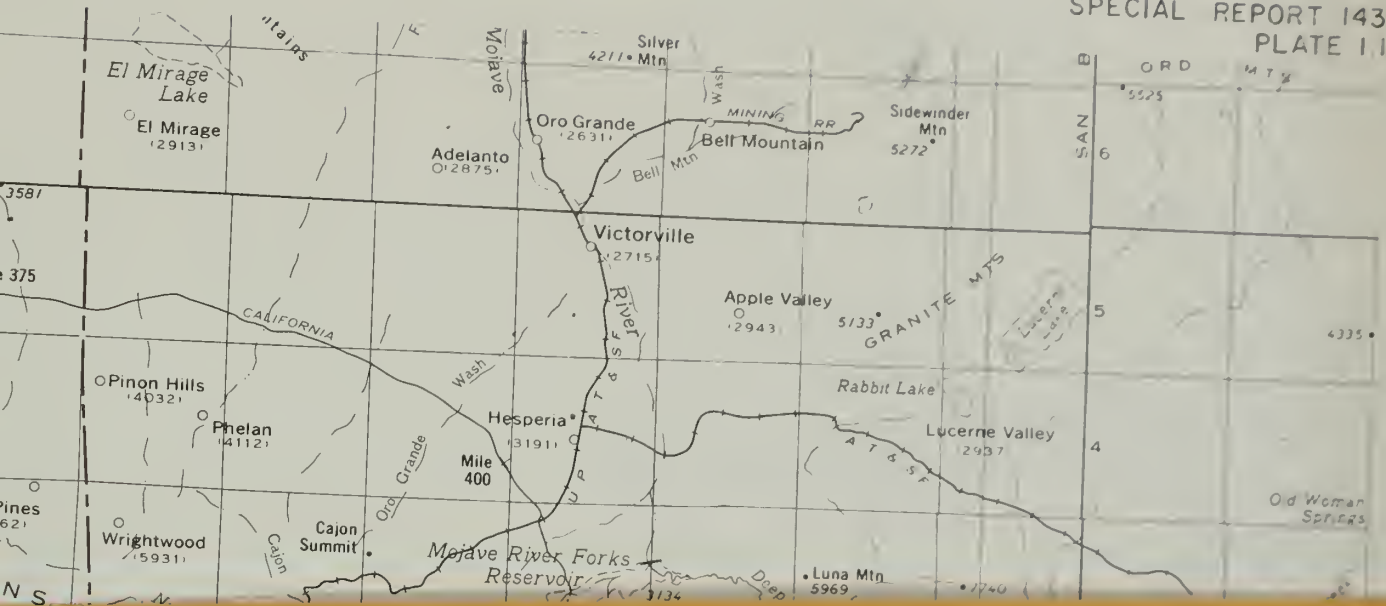
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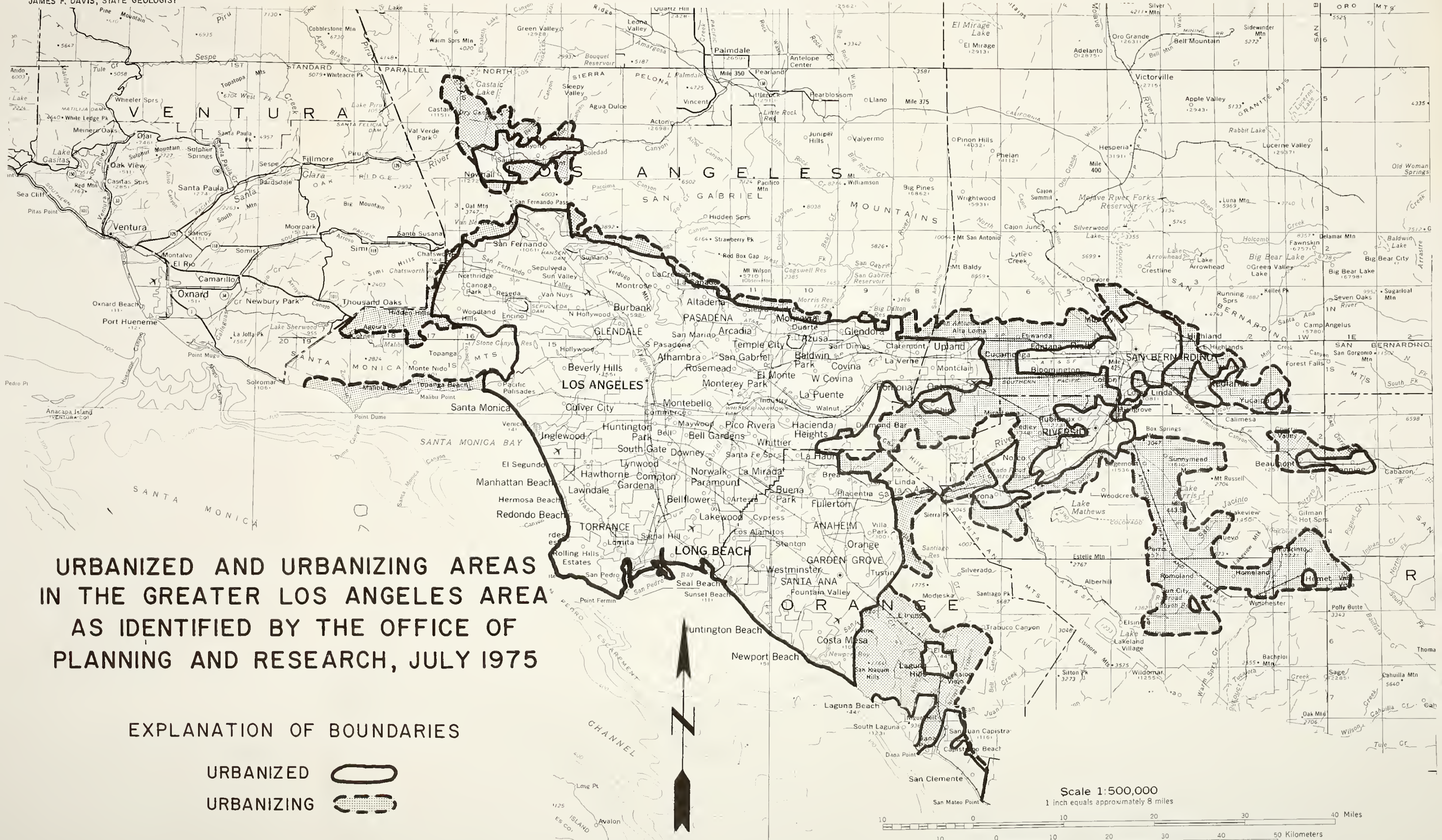
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COLLATE:

 7 PIECES



**URBANIZED AND URBANIZING AREAS
IN THE GREATER LOS ANGELES AREA
AS IDENTIFIED BY THE OFFICE OF
PLANNING AND RESEARCH, JULY 1975**

EXPLANATION OF BOUNDARIES

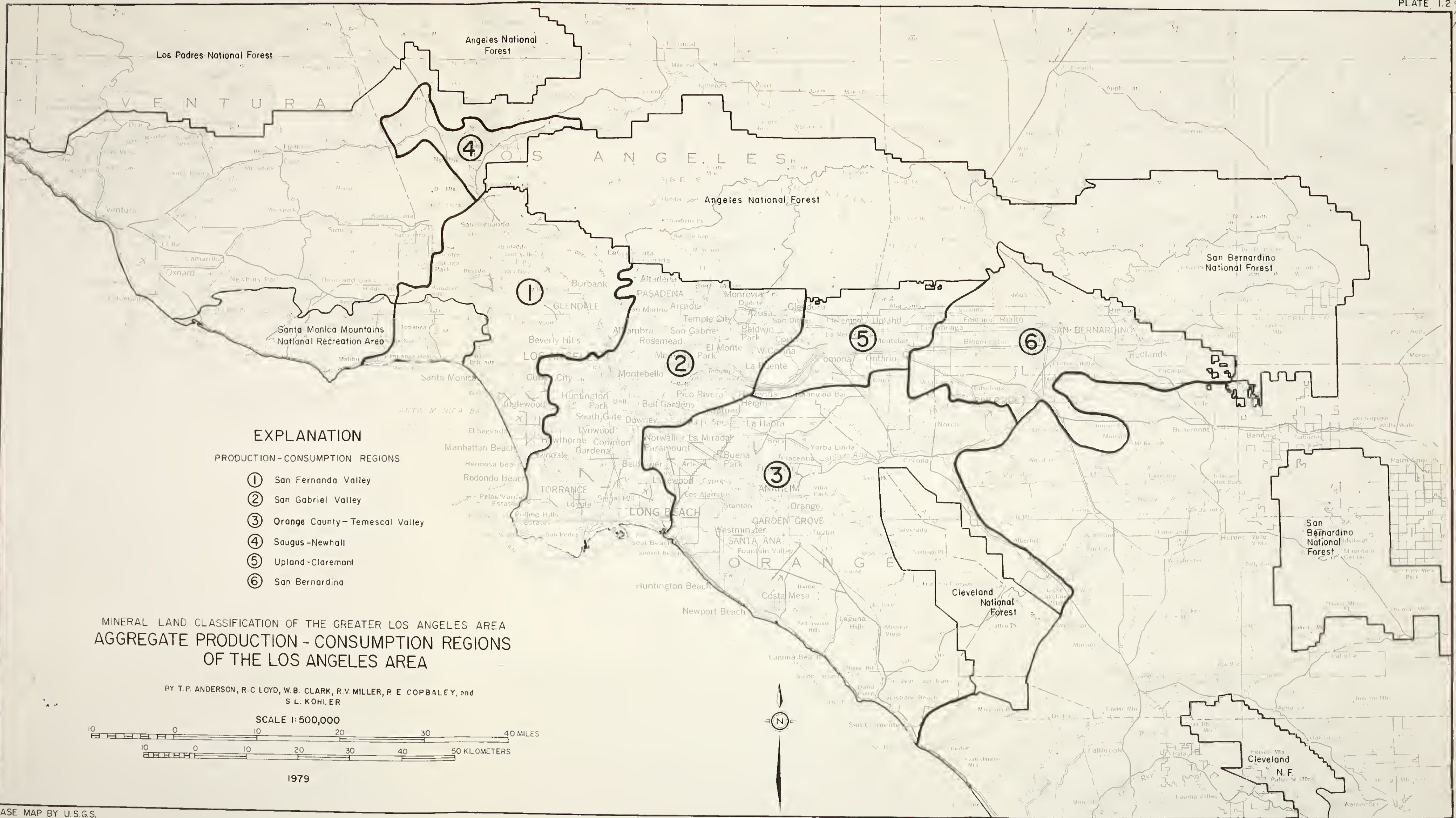
- URBANIZED 
- URBANIZING 

Scale 1:500,000
1 inch equals approximately 8 miles



BASE MAP BY U.S.G.S.

UNIVERSITY OF CALIFORNIA



EXPLANATION

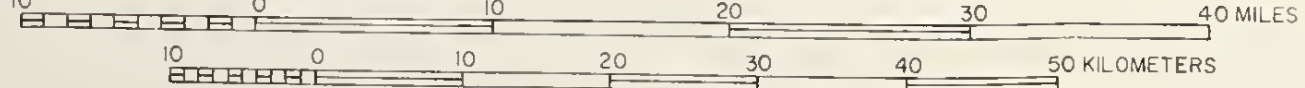
PRODUCTION-CONSUMPTION REGIONS

- ① San Fernando Valley
- ② San Gabriel Valley
- ③ Orange County - Temescal Valley
- ④ Saugus-Newhall
- ⑤ Upland-C Claremont
- ⑥ San Bernardino

**MINERAL LAND CLASSIFICATION OF THE GREATER LOS ANGELES AREA
AGGREGATE PRODUCTION - CONSUMPTION REGIONS
OF THE LOS ANGELES AREA**

BY T. P. ANDERSON, R. C. LOYD, W. B. CLARK, R. V. MILLER, P. E. COPBALEY, and
S. L. KOHLER

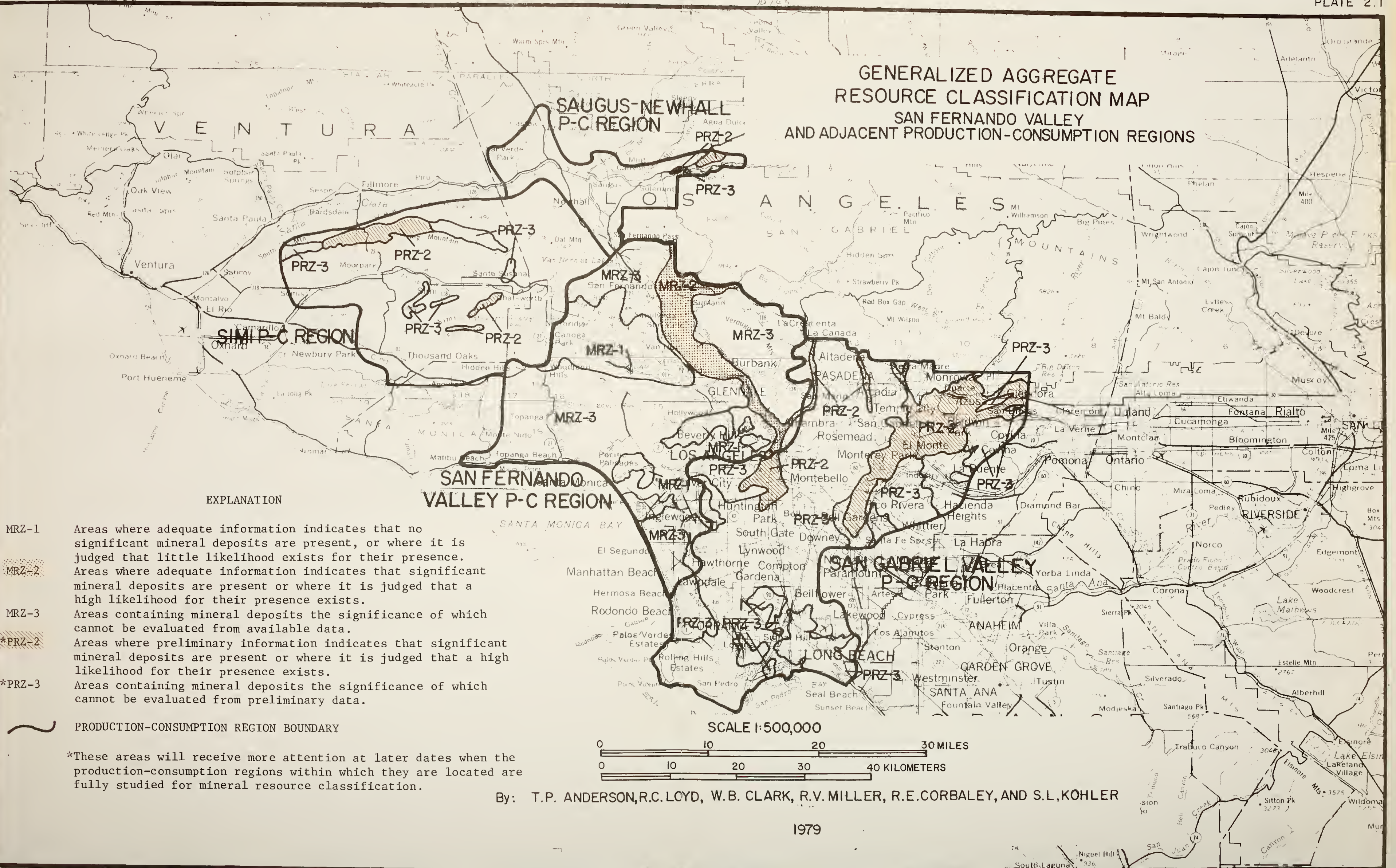
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1979



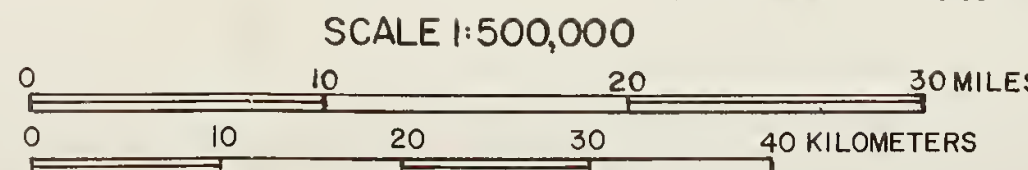
GENERALIZED AGGREGATE
 RESOURCE CLASSIFICATION MAP
 SAN FERNANDO VALLEY
 AND ADJACENT PRODUCTION-CONSUMPTION REGIONS



- EXPLANATION**
- MRZ-1 Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.
 - MRZ-2 Areas where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists.
 - MRZ-3 Areas containing mineral deposits the significance of which cannot be evaluated from available data.
 - *PRZ-2 Areas where preliminary information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists.
 - *PRZ-3 Areas containing mineral deposits the significance of which cannot be evaluated from preliminary data.

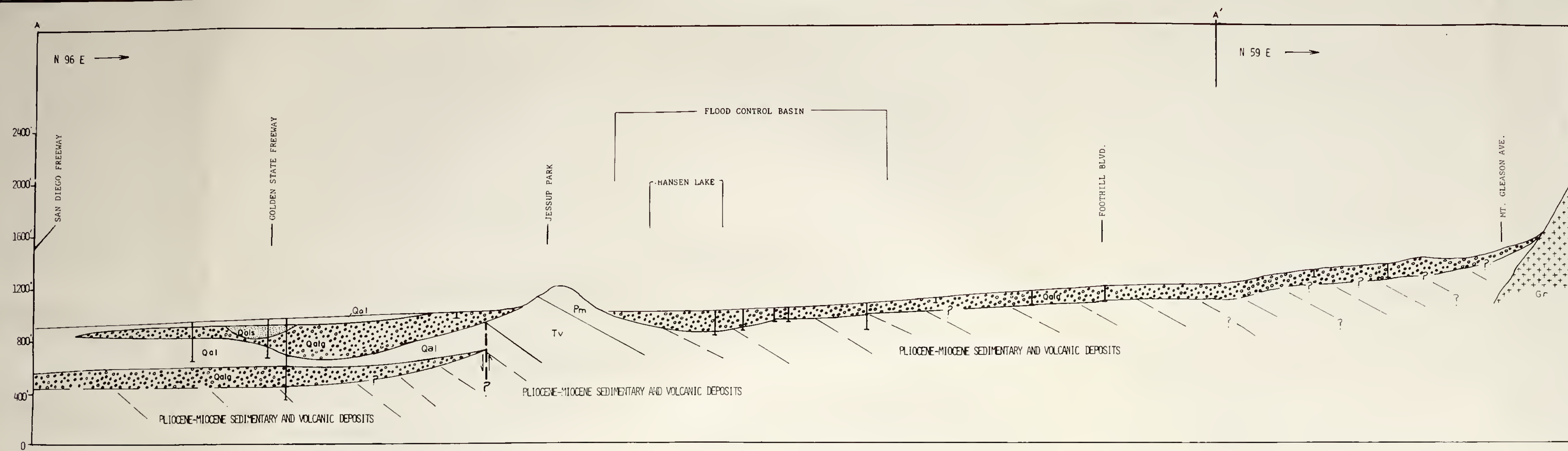
~ ~ ~ ~ ~ PRODUCTION-CONSUMPTION REGION BOUNDARY

*These areas will receive more attention at later dates when the production-consumption regions within which they are located are fully studied for mineral resource classification.

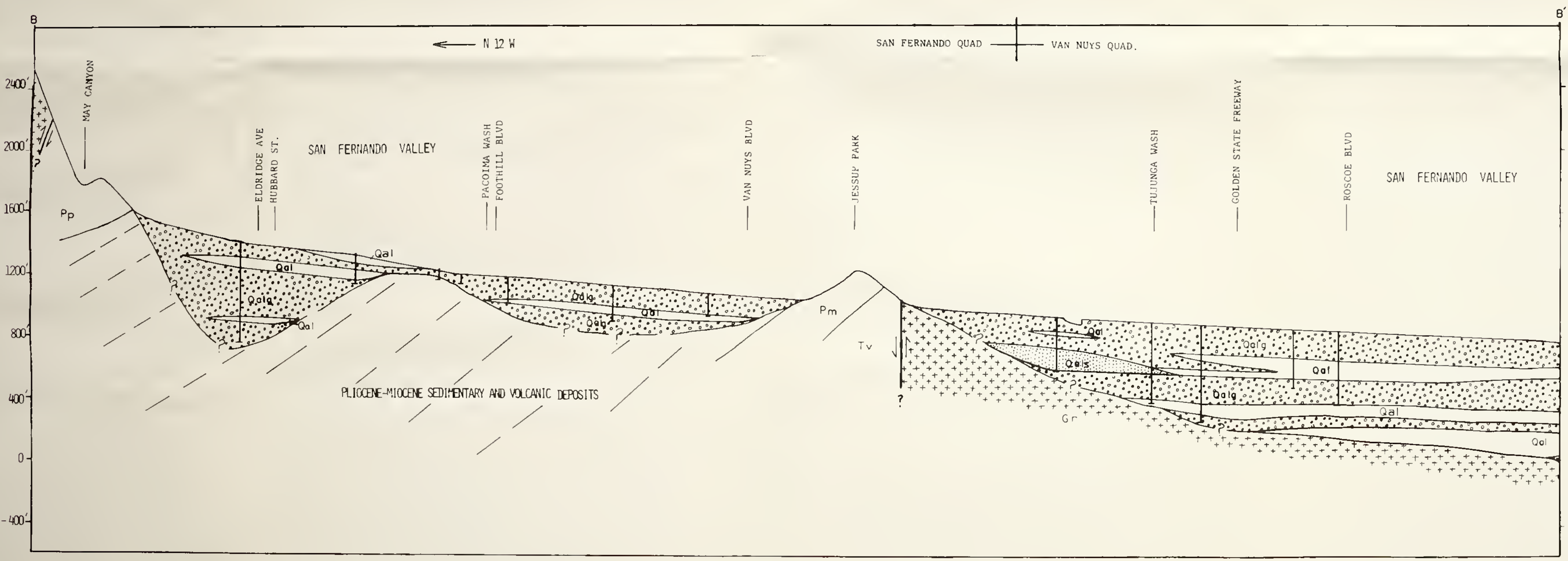


By: T.P. ANDERSON, R.C. LOYD, W.B. CLARK, R.V. MILLER, R.E. CORBALEY, AND S.L. KOHLER

1979



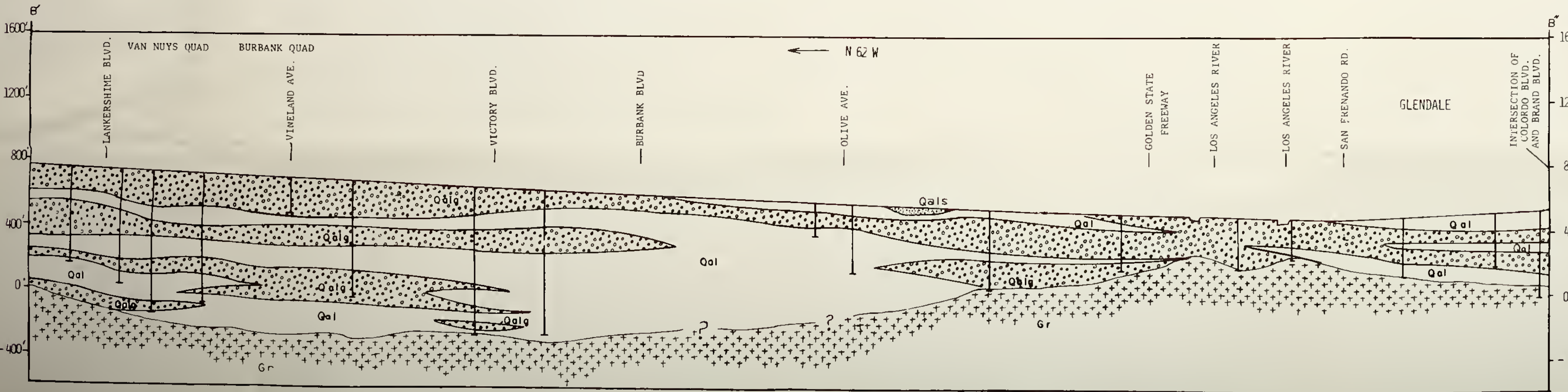
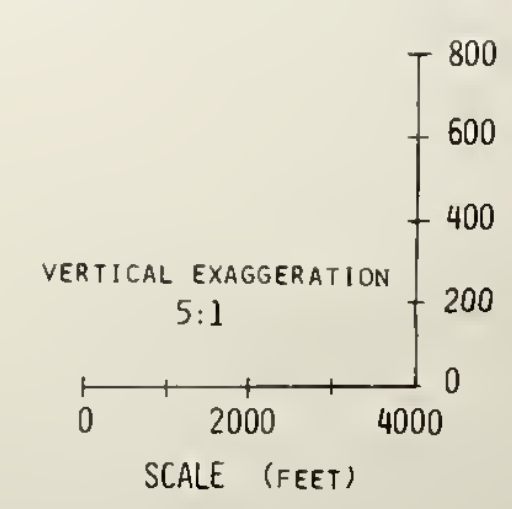
(See Plate 2.3 for geologic section locations)



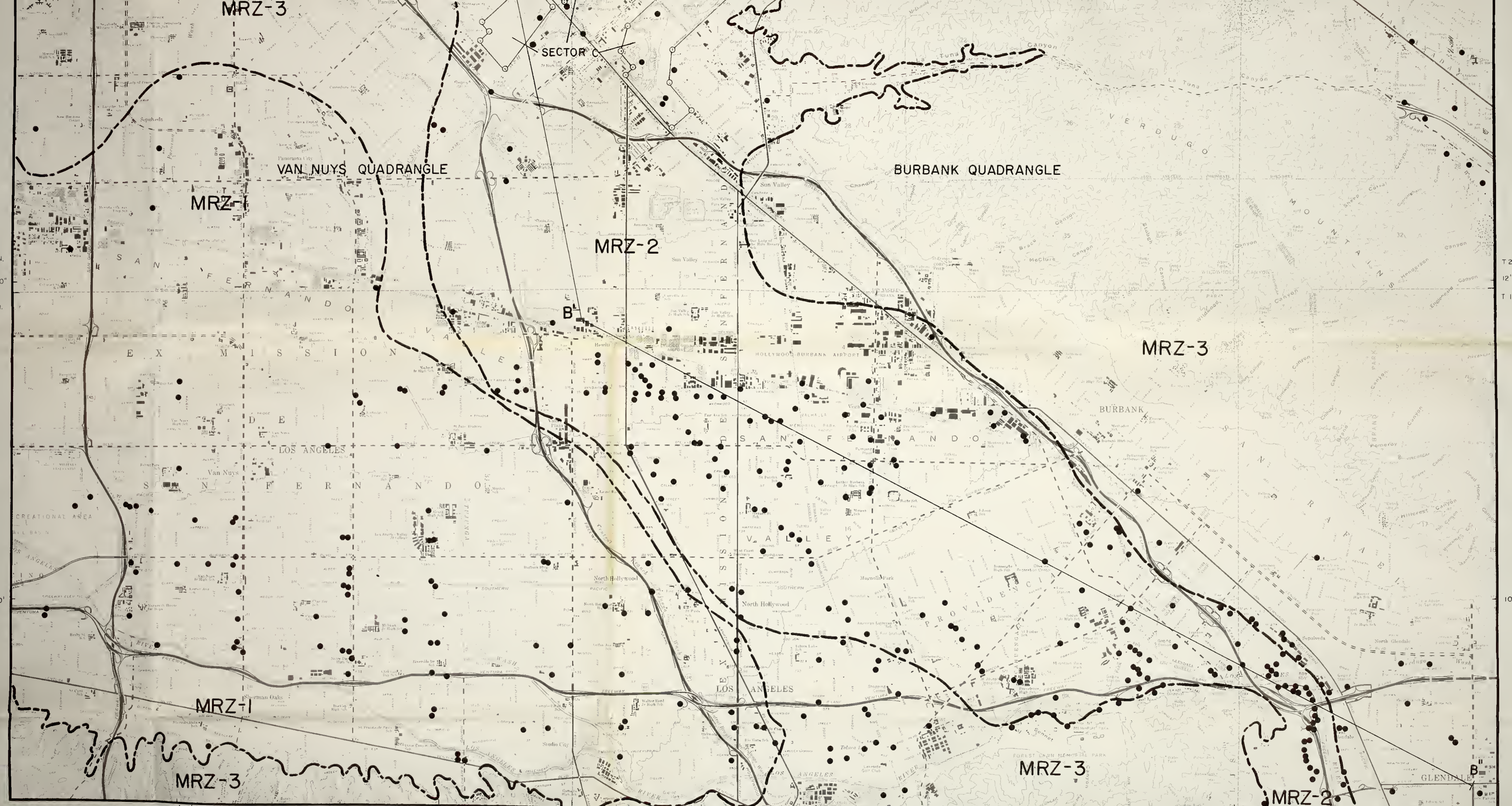
EXPLANATION

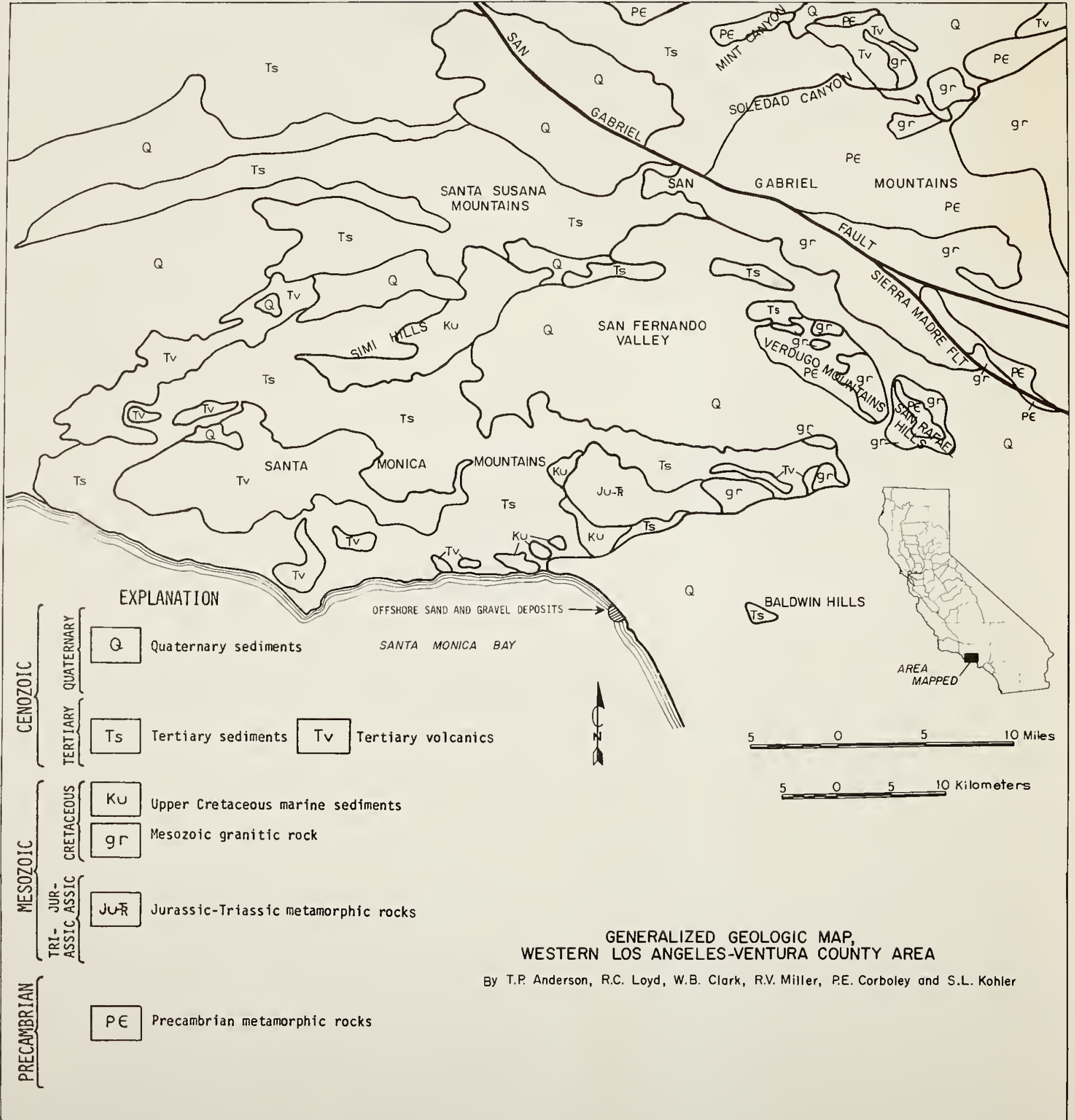
- | | | |
|-------------|-----------------------------------|--|
| | SEDIMENTARY AND METAMORPHIC ROCKS | IGNEOUS ROCKS |
| QUATERNARY | Qal | Holocene alluvial fan deposits: (al) undifferentiated; (Qal) predominantly sand and gravel; (Qals) predominantly sand. |
| | Qpt | Pleistocene stream terrace deposits: clay, sand, and gravel. |
| | Pp | Undifferentiated Plio-Pleistocene continental deposits, predominantly conglomerate. |
| | Pm | Undifferentiated Pliocene marine deposits: shale, sandstone and conglomerate. |
| TERTIARY | Mu | Undifferentiated upper Miocene marine deposits: shale, sandstone & conglomerate. |
| | Mm | Undifferentiated middle Miocene marine deposits: shale, sandstone, and conglomerate. |
| MESOZOIC | Tv | Middle Miocene volcanic rocks: rhyolite, andesite, and basalt flows, pyroclastic and breccias. |
| | Ku | Undifferentiated upper Cretaceous marine deposits: shale, sandstone, and conglomerate. |
| JURASSIC | Gr | Mesozoic intrusive igneous rocks: predominantly diorite and tonalite. |
| | | |
| PRECAMBRIAN | | -PALEOZOIC ROCKS ABSENT- |
| | | -CAMBRIAN ROCKS ABSENT- |
| | Pc | Precambrian gneiss |

Geology taken from: Barrows and others (1974); Corbato (1963); Hoots (1930); Jennings and Strand (1969); and unpublished water well log data, Los Angeles Flood Control District



MINERAL RESOURCE LAND CLASSIFICATION OF THE LOS ANGELES AREA
 GENERALIZED GEOLOGIC SECTION SHOWING SAND AND GRAVEL DISTRIBUTION, TUJUNGA FAN
 By: T.P. Anderson, R.C. Loyd, W.B. Clark, R.V. Miller, R.E. Corbaley, and S.L. Kohler
 1979



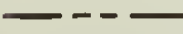

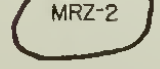
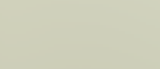







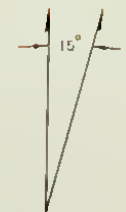
TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

EXPLANATION

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See text for additional explanation of MRZ Symbols.

HEIGHT INTERVAL 20 FEET
BASED ON MEAN SEA LEVEL
NATIONAL GRID SYSTEM, DATUM 1929



MAGNETIC NORTH
AND DECLINATION

BEVERLY HILLS, CALIF

MINERAL LAND CLASSIFICATION MAP
AGGREGATE RESOURCES ONLY

PREPARED IN COMPLIANCE WITH THE SURFACE MINING
AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

James F. Davis
STATE GEOLOGIST MAY 25, 1979

UNIVERSITY OF CALIFORNIA LIBRARY



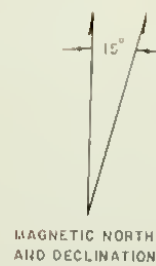
TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

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CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL



**MINERAL LAND CLASSIFICATION MAP
AGGREGATE RESOURCES ONLY**





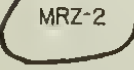
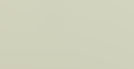
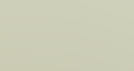
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James F. Davis
STATE GEOLOGIST MAY 25, 1979

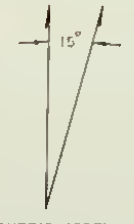


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MAGNETIC NORTH
AND DECLINATION

CALABASAS CALIF

**MINERAL LAND CLASSIFICATION MAP
AGGREGATE RESOURCES ONLY**

PREPARED IN COMPLIANCE WITH THE SURFACE MINING
AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

James F. Davis
STATE GEOLOGIST MAY 25, 1979

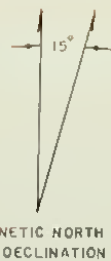


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CANOGA PARK, CALIF

**MINERAL LAND CLASSIFICATION MAP
 AGGREGATE RESOURCES ONLY**



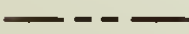

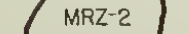


PREPARED IN COMPLIANCE WITH THE SURFACE MINING
 AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

James F. Davis
 STATE GEOLOGIST MAY 25, 1979

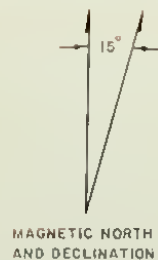


TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
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CONTOUR INTERVAL 40 FEET



CONDOR PEAK, CALIF.

MINERAL LAND CLASSIFICATION MAP
AGGREGATE RESOURCES ONLY

PREPARED IN COMPLIANCE WITH THE SURFACE MINING
AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761




James F. Davis
STATE GEOLOGIST MAY 25, 1979



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

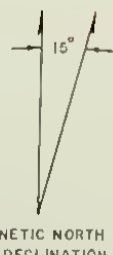
CONTOUR INTERVAL 20 FEET
C. T. EDGEMOND, RESIDENT 101001 PONTIAC
NATIONAL GEOGRAPHIC SOCIETY, 1929

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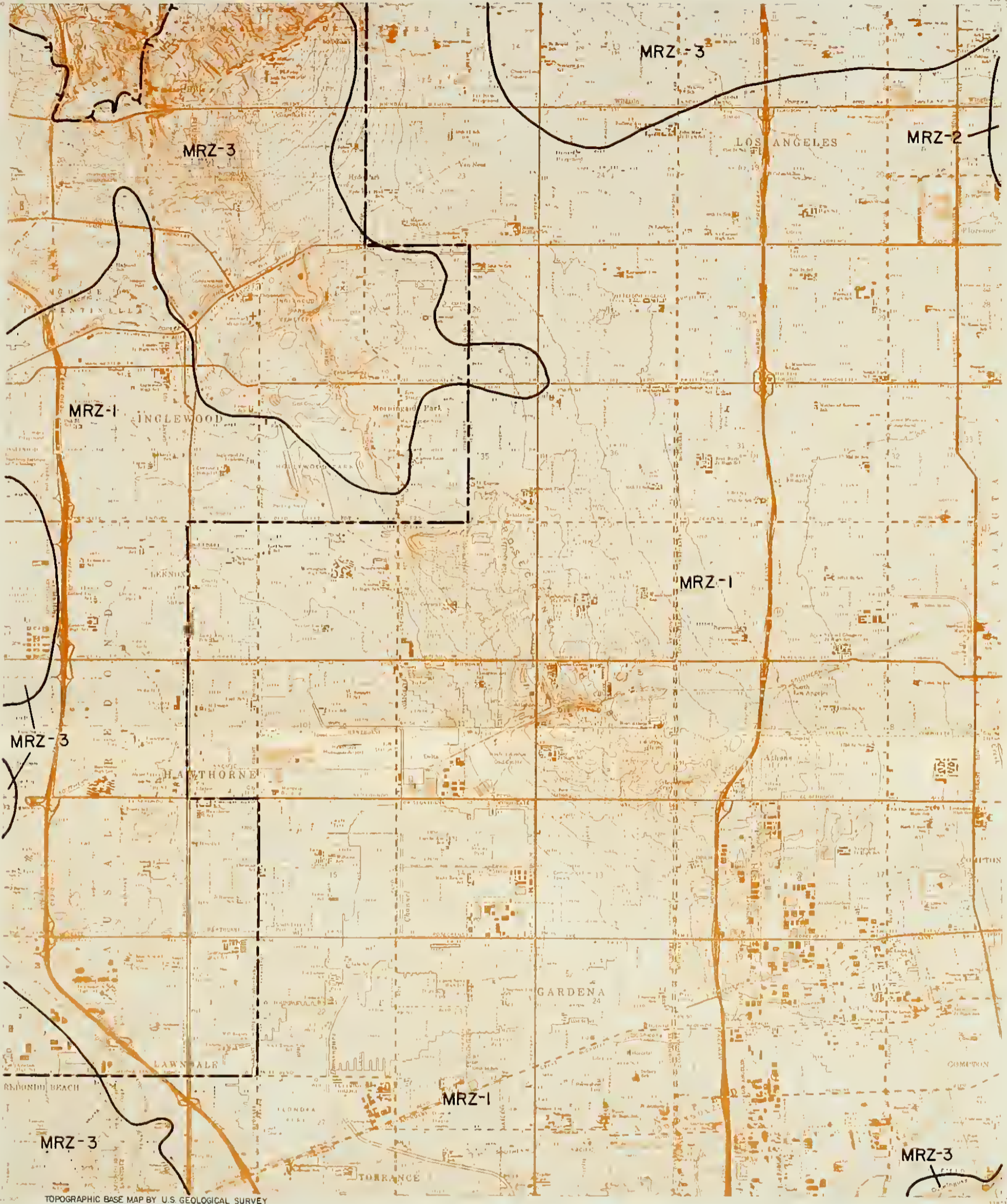


HOLLYWOOD, CALIF.

**MINERAL LAND CLASSIFICATION MAP
AGGREGATE RESOURCES ONLY**



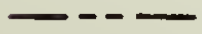
PREPARED IN COMPLIANCE WITH THE SURFACE MINING
AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761





James F. Davis
STATE GEOLOGIST MAY 25, 1979



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

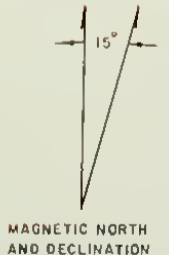
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CONTOUR INTERVAL 5 FEET
MAGNETIC NORTH AND DECLINATION

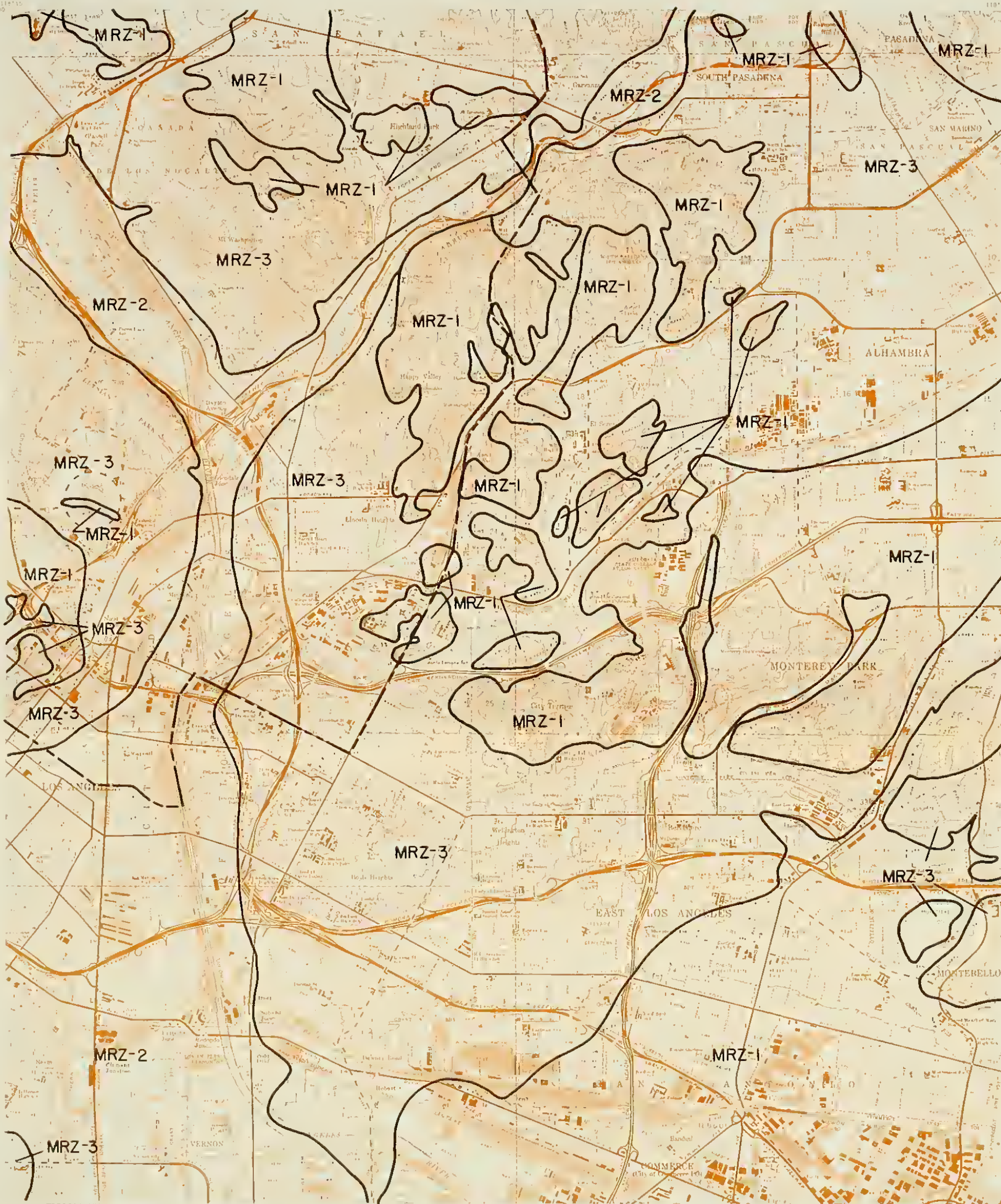
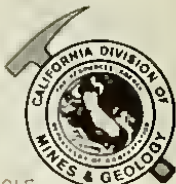


INGLEWOOD, CALIF

**MINERAL LAND CLASSIFICATION MAP
AGGREGATE RESOURCES ONLY**

PREPARED IN COMPLIANCE WITH THE SURFACE MINING
AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

James F. Davis
STATE GEOLOGIST MAY 25, 1979



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

EXPLANATION

OUTLINE INTERVAL - 1:125
1968 DATA REFLECTING 1967 AT "OUTLINE"
NAD 83 DATUM, UTM PROJECTION, 11N ZONE



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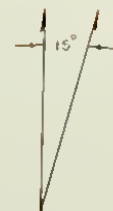
PRODUCTION-CONSUMPTION REGION BOUNDARY
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MINERAL RESOURCE ZONE BOUNDARIES



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MAGNETIC NORTH
AND DECLINATION

LOS ANGELES, CALIF.

**MINERAL LAND CLASSIFICATION MAP
AGGREGATE RESOURCES ONLY**




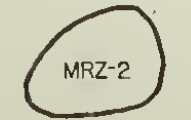
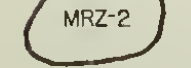
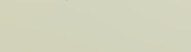

PREPARED IN COMPLIANCE WITH THE SURFACE MINING
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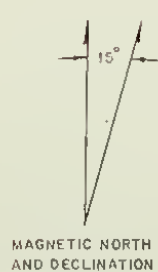
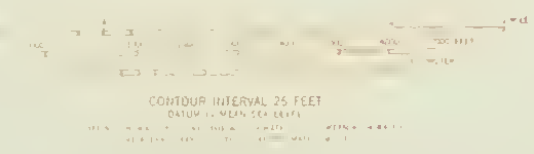
James F. Davis
STATE GEOLOGIST MAY 25, 1979



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

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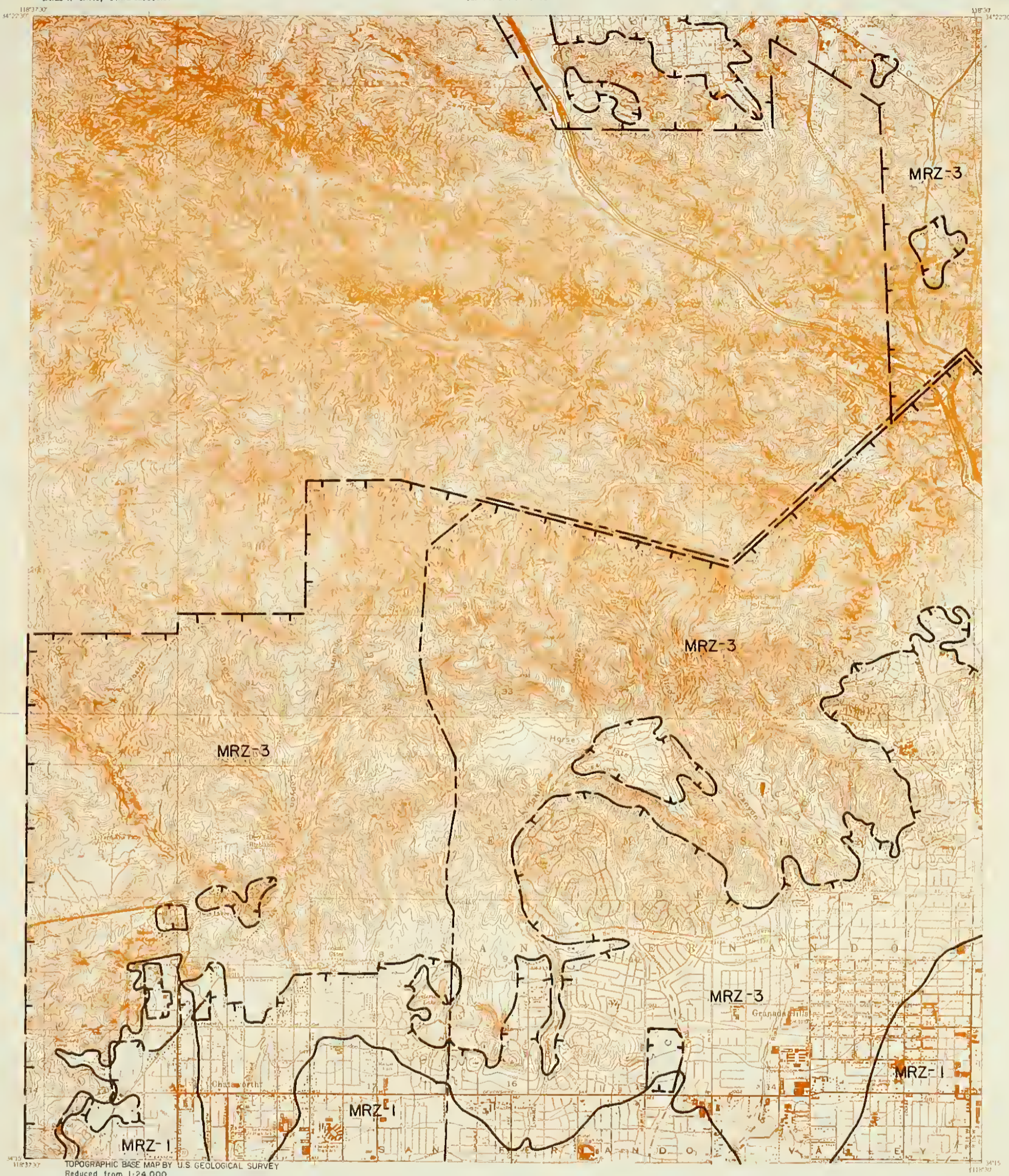


MALIBU BEACH, CALIF.

**MINERAL LAND CLASSIFICATION MAP
AGGREGATE RESOURCES ONLY**





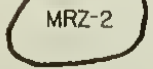
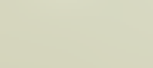
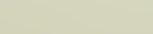
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James F. Davis
STATE GEOLOGIST MAY 25, 1979

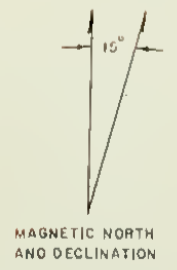


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OAT MOUNTAIN, CALIF.

**MINERAL LAND CLASSIFICATION MAP
AGGREGATE RESOURCES ONLY**




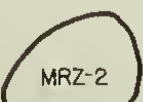
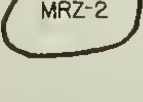
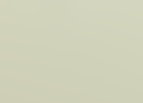
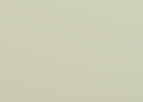
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CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929



PASADENA, CALIF

MINERAL LAND CLASSIFICATION MAP
AGGREGATE RESOURCES ONLY

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AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

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REDONDO BEACH, CALIF

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AGGREGATE RESOURCES ONLY**

PREPARED IN COMPLIANCE WITH THE SURFACE MINING
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James F. Davis
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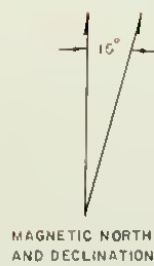
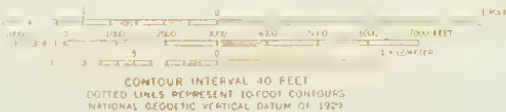
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PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

- MRZ-1 Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.
- MRZ-2 Areas where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists.
- MRZ-3 Areas containing mineral deposits the significance of which cannot be evaluated from available data.
- MRZ-4 Areas where available information is inadequate for assignment to any other MRZ zone.

See text for additional explanation of MRZ Symbols.



SAN FERNANDO, CALIF.

**MINERAL LAND CLASSIFICATION MAP
AGGREGATE RESOURCES ONLY**

PREPARED IN COMPLIANCE WITH THE SURFACE MINING
AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

James F. Davis
STATE GEOLOGIST MAY 25, 1979



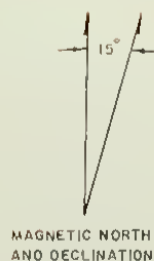
TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

EXPLANATION

- OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
Boundaries established from data supplied by the Office of Planning and Research with modifications developed from information supplied by local government and other sources. Hachures lie within area undergoing urbanization.
- EXISTING URBAN BOUNDARIES
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CONTOUR INTERVAL 40 FEET
DOTTED LINE REPRESENTS 200-FOOT CONTOUR
NATIONAL GRID REFERENCE SYSTEM OF 1929



SUNLAND, CALIF

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James F. Davis
STATE GEOLOGIST MAY 25, 1979



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

EXPLANATION



OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
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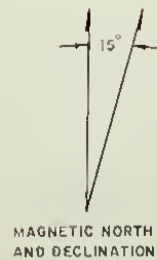
EXISTING URBAN BOUNDARIES
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PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

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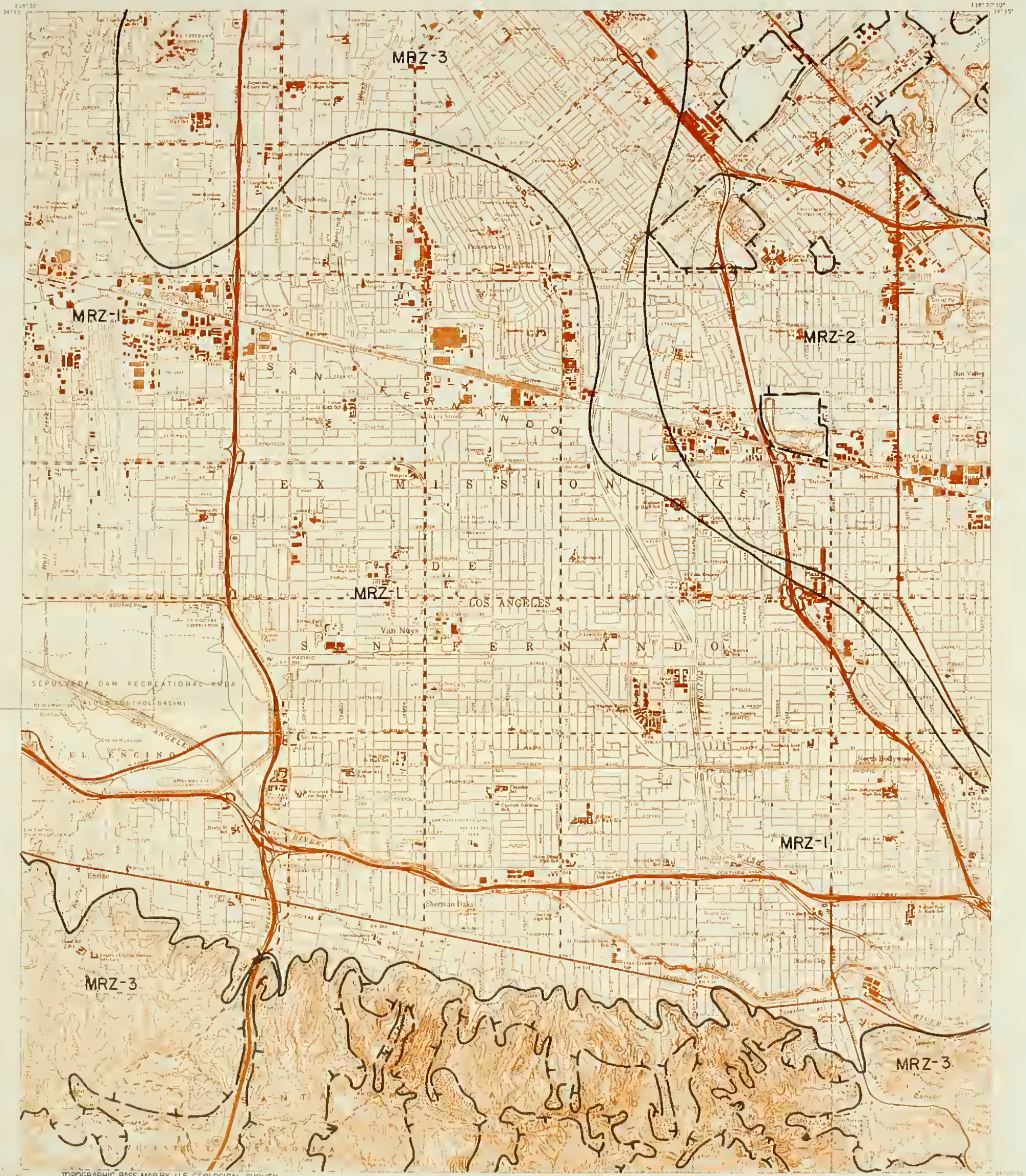
MAGNETIC NORTH
AND DECLINATION

TOPANGA, CALIF.

**MINERAL LAND CLASSIFICATION MAP
AGGREGATE RESOURCES ONLY**

PREPARED IN COMPLIANCE WITH THE SURFACE MINING
AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

James F. Davis
STATE GEOLOGIST MAY 25, 1979



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

EXPLANATION

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See text for additional explanation of MRZ Symbols.

CONTOUR INTERVAL 20 FEET
DOTTED LINE REPRESENTS EDGE OF CONTOUR
NATIONAL GEOGRAPHIC VERTICAL DATUM OF 1929



MAGNETIC NORTH
AND DECLINATION

VAN NUYS, CALIF

**MINERAL LAND CLASSIFICATION MAP
AGGREGATE RESOURCES ONLY**

PREPARED IN COMPLIANCE WITH THE SURFACE MINING
AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

James F. Davis
STATE GEOLOGIST MAY 25, 1979



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

EXPLANATION



OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
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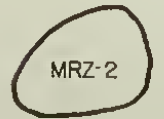


EXISTING URBAN BOUNDARIES
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PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES



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MAGNETIC NORTH
AND DECLINATION

VENICE, CALIF

**MINERAL LAND CLASSIFICATION MAP
AGGREGATE RESOURCES ONLY**

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AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

James F. Davis
STATE GEOLOGIST MAY 25, 1979

